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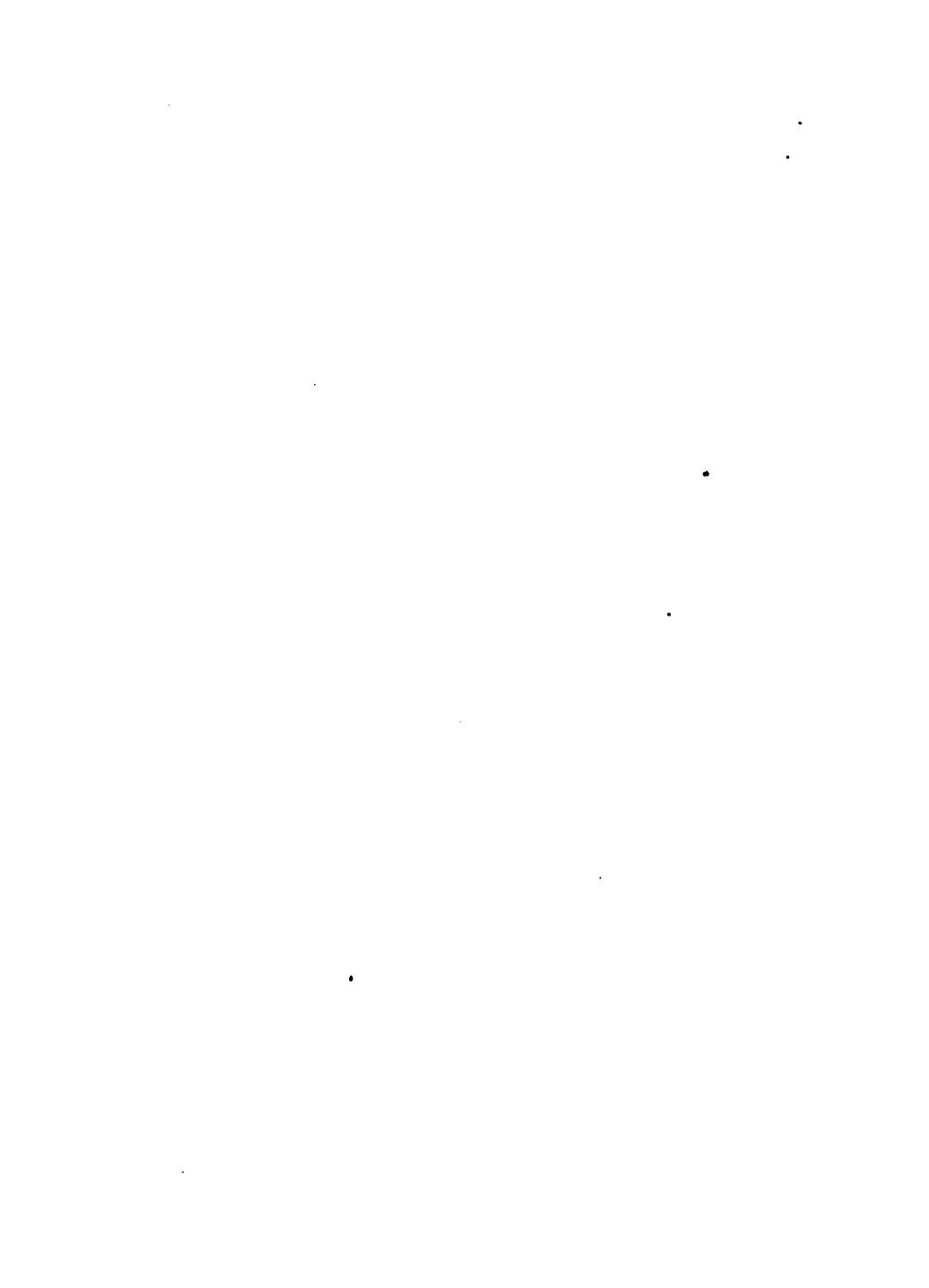
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A

PROGRESSIVE COURSE

OF

EXAMPLES IN ARITHMETIC.

LONDON:
R. CLAY, PRINTER, BREAD STREET HILL.

A

PROGRESSIVE COURSE

OF

EXAMPLES IN ARITHMETIC.

BY THE

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THE following Work has been drawn up with a view of supplying the want which the Author has felt in his own experience, of a course of Arithmetical Examples, adapted to the use of the more advanced Mathematical Schools, which may be placed in the hands of each pupil, and thereby save the time which is lost in dictating, or otherwise setting Questions to a Class. The Examples were originally prepared for the use of the Ordnance School, at Carshalton; but the Author has been induced to offer them generally to the public, in the hope that they may prove useful to others, who have experienced the same want as himself.

Many of the Examples in the following pages are original, whilst many others have been selected from the Cambridge, and Military, and other public Examination Papers.

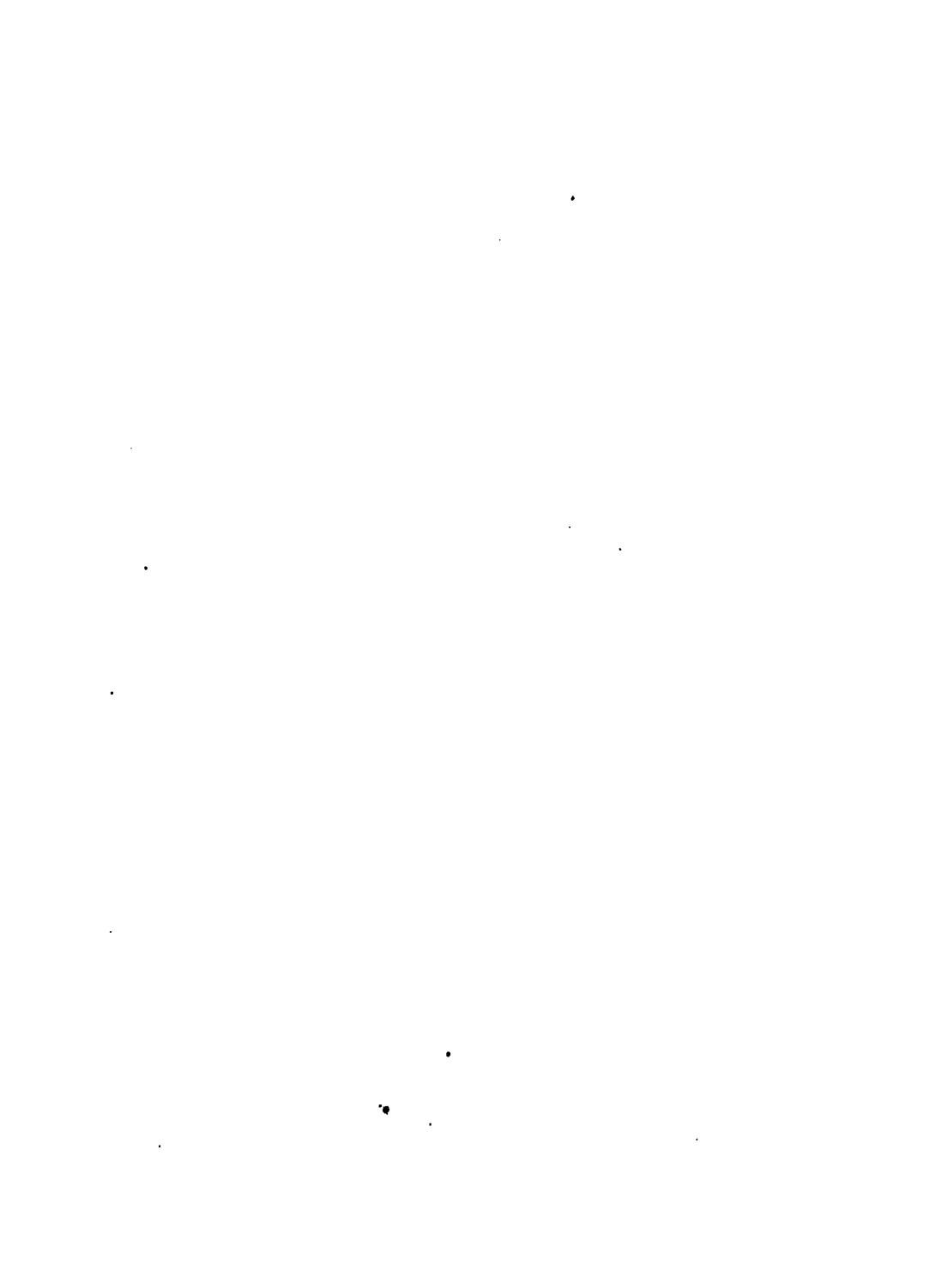


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EXAMPLES IN ARITHMETIC.

NUMERATION.

EXERCISE I.—Express the following in words:

- | | |
|------------------------|------------------------------|
| 1. 10010000101. | 9. 7060052100710431008. |
| 2. 1785600001. | 10. 21003000712003047800. |
| 3. 600000201. | 11. 1050320098105007036. |
| 4. 700020020. | 12. 50040070030685009120. |
| 5. 30900010103004. | 13. 8513078400061300180190. |
| 6. 200002000200101. | 14. 64201890005070003218. |
| 7. 1978600050010001. | 15. 8250746200078543012. |
| 8. 100200030040500600. | 16. 90807060050040300020100. |

NOTATION.

Ex. II.

Write the following in figures:

1. Seven hundred and twenty-six.
2. Seven thousand and twenty-six.
3. Seventy thousand two hundred and six.
4. Ninety billions one million two thousand and seventy.
5. Six thousand billions eight millions and three thousand.
6. Three hundred trillions seventy millions and eighty.
7. One hundred thousand trillions sixteen thousand millions.
8. Five hundred and nine millions six thousand and one.
9. Four trillions four thousand millions and forty.
10. Twenty thousand billions two hundred thousand.
11. One hundred and six billions eighty thousand and forty millions nine hundred and two thousand and fifty.
12. Seven thousand billions thirty-two thousand and five millions twelve thousand and ten.
13. Thirteen thousand billions six thousand four hundred millions eleven thousand and five.

14. Twenty-five trillions eighteen thousand billions sixty-five millions forty thousand and seventeen.
15. One hundred trillions eight hundred thousand and two billions eighty-seven thousand and nineteen millions thirty thousand and twenty-one.
16. Two thousand and fifty-six trillions fourteen thousand and seventy billions five hundred thousand three hundred and two millions nine hundred thousand six hundred and thirteen.

SIMPLE RULES.

Ex. III.

1. Add together 17856403, 204507819, and 35000704.
2. Subtract 7836289 from 8765427.
3. Add together 145796 and 2358479, and subtract 1875469 from the result.
4. Multiply 98756 by 35724.
5. Multiply 246800745 by 9999.
6. Multiply 684010875 by 49999.
7. Find the continued product of 2875, 3259, and 1674.
8. Multiply the sum of 928374650 and 928311860 by their difference.
9. What will be the quotient and remainder when 3207140086281 is divided by 84 by short division?
10. Divide 7890567 by 42, first by long division, and secondly by its factors 6 and 7.
11. Multiply 238957 by 406509, and divide the product by 135503.
12. Divide 1708058240940 by 4567, and prove the operation.
13. Divide 1101948236 by 2974, and prove the result.
14. Divide 5509746097 by 1472, and prove the result.
15. Divide 25105170684379 by 5021, and prove the result.
16. Multiply forty thousand five hundred and twenty-eight millions seven hundred and six thousand seven hundred and nine, by fifty-three thousand millions eighteen thousand and ninety-seven.
17. Multiply seven millions nine thousand and seven, by three millions fifty thousand seven hundred ; and divide the product by one million sixteen thousand nine hundred.
18. Multiply seven millions ninety-one thousand and eight by four millions fifty-two thousand and seventy ; and divide the product by thirty-six thousand eight hundred and thirty-six.

19. Multiply ten millions thirty-eight thousand and forty-eight, by one million fifteen thousand; and divide the product by one hundred and twenty-six thousand eight hundred and seventy-five.
20. What number divided by 48762 will give 6285 for quotient and 26108 for remainder ?
21. What number multiplied by 285 will give 1490097385 for the product ?
22. Find that number which when divided by 90009 gives 746115 for a quotient, with 83337 for a remainder ?
23. The product is 26299989276, and the multiplicand is 800706; what is the multiplier ?
24. If the dividend be 21810149152, and the quotient be 39314; what is the divisor ?
25. The Moon's distance from the Earth is two hundred and forty thousand miles, and the Sun's ninety-five millions of miles; how much is the Sun farther from the Earth than the Moon ?

REDUCTION.

Ex. IV.

1. Reduce £8275 13s. 6*½*d. to farthings.
2. How many groats are there in £60172 13s. 4d. ?
3. Find how many threepenny pieces are contained in £9475 18s. 9d. ?
4. In £10728 12s. 6d. how many half-crowns, sixpences, and three-farthing pieces are there ?
5. In 4 tons, 6 cwt. 2 qrs. 17 lbs. 9 oz., how many ounces ?
6. How many square yards are there in a field 10 acres, 2 roods, 3 poles in area ?
7. Find the number of inches in 5 miles, 6 furs. 22 yds.
8. Reduce 6 miles, 3 furs., 25 poles, $3\frac{1}{2}$ yds., 6 in. to inches.
9. How many seconds are there in 1 day, 5 hrs. 48 mins. 30 secs. ?
10. How many farthings are there in 3 sovereigns, 3 half-sovereigns, and 3 half-crowns ?
11. How many days, hours, minutes and seconds, are there in 1178825 seconds ?
12. How many tons, cwts., qrs., and lbs., are there in 19692175 lbs. ?
13. Reduce 4203239040 cubic inches to cubic yards.

14. How many tons, cwt., &c., are there in 97664 ounces avoirdupois ?
15. Find the number of cubic yards in 139968 cubic inches ; the number of square yards in the same number of square inches ; and the number of lineal yards in the same number of lineal inches ?
16. How many seconds will have passed from the birth of Christ before the beginning of April, 1856 ?

COMPOUND ADDITION AND SUBTRACTION.

Ex. V.

1. Add together £1037 13s. 5d.; £56 5s. 2d.; £712 0s. 3½d.; £1123 19s. 5½d.
2. Subtract £3562 19s. 7d. from £4571 13s. 2d.; and verify the result.
3. From £3251 11s. 7d. take £2615 13s. 9d., and prove the result.
4. Add together £3248 9s. 8d. and £456 5s. 2d., and subtract from the result £591 17s. 11d.
5. Add together 10 yds. 1 ft. 9 in.; 7 yds. 2 ft. 4 in.; 18 yds. 1 ft. 5 in.
6. Find the sum of 12 yds. 3 qrs. 3 nls.; 7 yds. 2 qrs. 1 nl.; 37 yds. 1 qr. 2 nls.
7. Find the sum of 723 tons, 14 cwt. 2 qrs. 15 lbs.; 24 tons, 8 cwt. 1 qr. 23 lbs.; 584 tons, 17 cwt. 3 qrs. 8 lbs.; 1 cwt. 27 lbs.; 15 tons, 3 qrs.
8. Find the sum of 1076 lbs. 11 oz. 18 dwts. 23 grs.; 142 lbs. 1 oz. 7 dwts. 14 grs.; 63 lbs. 9 dwts. 6 grs.; 48 lbs. 16 grs.; 1 lb. 1 oz. 2 dwts. 2 grs.
9. Find the sum of 16 lbs. 8 oz. 7 drs. 2 scrs. 15 grs.; 201 lbs. 1 oz. 6 drs. 1 scr. 19 grs.; 11 lbs. 11 oz. 3 drs. 2 scrs. 18 grs.
10. Required the sum of 47 yrs. 67 ds. 12 hrs. 11 mins. 23 secs.; 1021 yrs. 154 ds. 47 hrs. 18 mins. 42 secs.; 11 yrs. 219 ds. 35 mins. 57 secs.
11. Required the sum of 75 acres, 2 roods, 18 poles; 4823 ac. 3 ro. 39 po.; 1165 ac. 1 ro. 34 po.; 23 ac. 3 ro. 19 po.
12. Add together 27 qrs. 5 bus. 3 pks. 1 gal.; 803 qrs. 7 bus. 2 pks.; 8 qrs. 2 bus. 1 pk. 1 gal.; 16 qrs. 4 bus. 2 pks. 1 gal.
13. What is the difference between 4276 cub. yds. 16 cub. ft. 1084 cub. in., and 809 cub. yds. 23 cub. ft. 1523 cub. in.
14. Subtract 2006 tons, 17 cwt. 2 qrs. 24 lbs. 13 oz. 13 drs. from 3384 tons, 3 cwt. 3 qrs. 17 lbs. 15 oz. 11 drs., and verify the result.
15. A clock has its face marked so as to show 24 hours in a day,

and on a certain evening, half an hour after sunset, it was set at 24 o'clock. The following morning it was 4 minutes past 8, when by a common clock it was 8 minutes past 4. Find the time of sunset the previous evening.

COMPOUND MULTIPLICATION.

Ex. VI.

1. Multiply £55 17s. 4½d. by 12.
2. ... £5627 1s. 2½d. by 64.
3. ... £2915 4s. 2½d. by 13.
4. ... £3761 16s. 2½d. by 459.
5. ... £327 8s. 5½d. by 567.
6. ... £964 19s. 8½d. by 674.
7. ... £4006 18s. 10½d. by 668.
8. ... £837 14s. 8½d. by 746.
9. ... £763 13s. 7½d. by 875.
10. ... £989 10s. 7½d. by 3276.
11. ... £569 13s. 9½d. by 7982.
12. ... £987 15s. 9½d. by 7392.
13. ... £887 14s. 11d. by 6967.
14. ... £976 7s. 5½d. by 5809.
15. ... £738 11s. 7½d. by 6495.
16. ... £809 19s. 8½d. by 7089.
17. ... £874 9s. 5d. by 3849.
18. ... £995 13s. 8½d. by 4967.
19. ... £787 19s. 7½d. by 4697.
20. ... £989 18s. 10½d. by 9809.
21. ... £1008 9s. 2½d. by 1803.
22. ... £3708 9s. 10½d. by 1398.
23. ... £270 1s. 4½d. by 6435.
24. ... 139 lbs. 9 oz. 2 dwts. 9 grs. by 166.
25. ... 927 lbs. 3 oz. 11 dwts. 6 grs. by 342.
26. ... 237 tons, 5 cwt. 0 qrs. 14 lbs. by 564.
27. ... 2 cwt. 3 qrs. 25 lbs. 1 oz. by 73.
28. ... 144 miles, 5 furs. 34 poles, 1 yd. by 213.
29. ... 17 wks. 6 ds. 6 hrs. 42 mins. by 113.
30. ... 13 acres, 2 roods, 17½ poles, by 213.

COMPOUND DIVISION.

Ex. VII.—CASE I.

1. Divide £389 11s. 7d. by 7.
2. ... £467 12s. 3½d. by 9.
3. ... £8451 3s. 5½d. by 8.
4. ... £2467 15s. 10½d. by 100.
5. ... £10873 7s. 7½d. by 300.
6. ... £20654 12s. 4½d. by 56.
7. ... £85320 1s. 8½d. by 81.
8. ... £92103 17s. 1½d. by 144.
9. ... £180078 0s. 7½d. by 125.
10. ... £201096 1s. 0½d. by 441.
11. ... £46789 16s. 11½d. by 504.
12. ... £96835 18s. 10½d. by 397.
13. ... £49865 15s. 10¾d. by 596.
14. ... £36948 19s. 11½d. by 948.
15. ... £29654 0s. 0¾d. by 375.
16. ... £68596 16s. 0½d. by 869.
17. ... £87629 18s. 10¼d. by 987.
18. ... £48962 16s. 6½d. by 698.
19. ... £696485 2s. 9¾d. by 765.
20. ... £394695 6s. 3½d. by 399.
21. ... £2017358 12s. 8½d. by 9678.
22. ... £375326 14s. 4½d. by 7735.
23. ... £5620087 10s. 6½d. by 6427.
24. ... £920687 2s. 6½d. by 5278.
25. ... £1076429 1s. 10¾d. by 2109.
26. ... £871324 9s. 11½d. by 3333.
27. ... £46854 9s. 8½d. by 1187.
28. ... £689435 18s. 10½d. by 4763.
29. ... £946394 16s. 0¾d. by 2098.
30. ... £964697 0s. 11½d. by 9876.
31. ... 57915 lbs. 3 oz. 10 dwts. 12 grs. by 606.
32. ... 2959 lbs. 2 oz. 12 dwts. 10 grs. by 406.
33. ... 19116 tons, 1 cwt. 2 qrs. by 564.
34. ... 25808 cwt. 2 qrs. 2 lbs. 14 oz. by 338.
35. ... 6859 miles, 7 furs. 36 po. 4 yds. 2 ft. 8 in. by 756.

36. Divide 9468 miles, 3 furs. 29 po. 5 yds. 1 ft. 6 in. by 987.
37. ... 1884742 acres, 2 roods, 15 poles, by 705.
38. ... 121260 cub. yds. 22 cub. ft. 392 cub. in. by 584.
39. ... 5968 wks. 5 ds. 18 hrs. 57 mins. 46 secs. by 789.
40. ... 6948 yrs. 6 ms. 3 wks. 6 ds. 14 hrs. 56 mins. 54 secs. by 675.

Ex. VIII.—CASE II.

1. Divide £10683 14s. 2½d. by £42 11s. 3½d.
2. ... £70639 12s. 4d. by £7 10s. 0½d.
3. ... £410677 13s. 6¼d. by £41 1s. 5½d.
4. ... £240037 8s. 6½d. by £57 4s. 1½d.
5. ... 3418 cwt. 3 qrs. 6 lbs. 14 oz. by 3 cwt. 3 qrs. 6 lbs. 14 oz.
6. ... 4108 tons, 4 cwt. 1 qr. 24 lbs. by 6 tons, 9 cwt. 1 qr. 16 lbs.
7. ... 5608 lbs. 10 oz. 8 dwts. by 13 lbs. 8 oz. 19 dwts. 8 grs.
8. ... 4167 qrs. 2 bus. 1 pk. 1 gal. by 7 qrs. 3 bus. 2 pks. 1 gal.
9. ... 8697 bus. 2 pks. by 15 bus. 1 pk. 0 gals. 2 qts.
10. ... 7209 days, 22 hrs. 48 mins. 12 secs. by 7 days, 11 hrs. 30 mins. 3 secs.

N.B.—The results in Exercises VII. and VIII. should be verified by Multiplication.

MISCELLANEOUS EXAMPLES.

Ex. IX.

1. How many pounds, shillings, and pence are there in 13 guineas, 25 half-crowns, 17 florins, and 19 groats?
2. How long would it take to count £780,000,000, the amount of the National Debt, at the rate of £100 per minute?
3. How many dollars are there in £289 17s., at 4s. 3d. per dollar?
4. If a wheel makes 64640 revolutions in passing over 202 miles, what is its circumference?
5. If 1000 sovereigns weigh 21 lbs. 5 oz. 16 dwts. 6 grs., what is the weight of one sovereign?
6. The length of the quick-march step is 30 inches, 108 of which go to the minute; at what rate per hour is that?
7. The pressure of the atmosphere on every square inch of surface is 15 lbs.; find the pressure upon the superficies of the human body, supposing it to be equal to 14 square feet.

8. If a sheet of paper, $5\frac{1}{2}$ feet long by $2\frac{1}{2}$ feet broad, be cut into strips 1 inch broad ; how many sheets would be required to form a strip that would reach round the Earth (25000 miles) ?
9. Sound travels at the rate of 1142 feet in a second ; if, after a flash of lightning is seen, $4\frac{1}{4}$ minutes elapse before the thunder is heard, how far is the storm distant ?
10. Light travels at the rate of 192268 miles in a second ; find how long a ray of light is in coming from the Sun to the Earth, a distance of 95,000,000 miles ?
11. In £714 17s. $5\frac{3}{4}d.$, how many crowns, half-crowns, threepenny pieces, and threefarthing pieces ?
12. If a person lay by £19 12s. 6d. out of a yearly income of £120, how much does he spend per day ?
13. How many pounds are there in 3 cwt. 3 qrs. 27 lbs. ? Also, how many parcels each 10 lbs. 4 oz. can be made up of the same weight ?
14. What is the value of 2475 yards of cloth, at 13s. $10\frac{1}{2}d.$ per yard ? Also, how many coins, worth 1s. $6\frac{1}{2}d.$ each, would pay for it ?
15. A gentleman spends daily £1 7s. $10\frac{1}{2}d.$, and at the year's end lays by £340 ; what is his yearly income ?
16. Find the circumference of a wheel which makes 16160 revolutions in passing over $25\frac{1}{4}$ miles.
17. What is the value of 1 ton, 8 cwt. $8\frac{1}{2}$ lbs., at 5d. for $1\frac{1}{4}$ lbs. ?
18. A grocer bought 3 chests of tea, which weighed together 7 cwt. 1 qr. 17 lbs. ; one of them weighed 22 lbs. more than either of the others ; what were their respective weights ?
19. At a certain election 3750 persons voted, and the successful candidate had a majority of 910 ; how many voted for each ?
20. A person distributed 120 shillings among 100 persons, giving to some of them 9d. each, and 15d. to each of the remainder ; how many received 15d. ?
21. One day's wages of 240 labourers, some receiving 12d. each, and others 16d. each, amounted to £15 ; how many received 12d. and how many 16d. ?
22. *A* owes to *B* one hundred and eleven half-guineas ; to *C* fifty-three crowns ; to *D* three hundred and twenty dollars at 4s. 6d. each ; to *E* fifteen hundred half-crowns ; to *F* two hundred and fifty francs at $10\frac{1}{2}d.$ each ; to *G* one thousand and twenty-seven half-pence : what is the amount of *A*'s debt ?
23. If 29040 copies of a book be printed, each copy consisting of 3

sheets, and each sheet occupying 7 square feet in size; how many acres will one edition cover?

24. Prize money to the amount of £103368 16s. 10 $\frac{1}{2}$ d. is to be divided amongst 5793 men; what will be each man's share?

25. Divide 2468 roods, 8 poles, 26 yds. 3 ft. by 33, and prove the result by Multiplication.

26. The price paid for a silver salver, weighing 6 lbs. 6 oz., was £33 16s.; the duty was 1s. 6d. per oz., and the workmanship 1s. 9d. per oz.; what was the price of the silver per oz.?

27. In 5146 pieces of money each 17s. 3 $\frac{1}{2}$ d., as many more each 4s. 3 $\frac{1}{2}$ d., and as many more each 1s. 7 $\frac{1}{2}$ d., how many Napoleons each 16s. 7 $\frac{1}{2}$ d.?

28. A great-coat costs £1 5s., a hat 17s. 6d., a pair of shoes 6s. 8d., and a pair of socks 9d.; what is the cost of supplying a regiment of 999 men with a coat and hat, and two pairs of shoes and socks, apiece?

29. In 4176 pieces of money each 11s. 6d., as many more each 4s. 9 $\frac{1}{2}$ d., and as many more each 3s. 7d., how many dollars each 5s. 4 $\frac{1}{2}$ d.?

30. Out of 748 parcels of tea, each weighing 2 qrs. 15 lbs., and as many more 1 cwt. 0 qrs. 17 lbs. each; how many parcels could be made 7 cwt. 2 qrs. 8 lbs. each?

31. A tenant holds a farm of 350 acres, subject to a tax of 3s. 6d. per acre, and a corn-rent of 100 quarters of wheat, barley, oats, and beans, respectively. Find the amount of his rent, when the average prices of wheat, barley, oats, and beans, per quarter, are 38s. 9d., 27s. 4d., 17s. 4d., and 33s. 10d., respectively.

32. If each inmate of a workhouse cost per week 2s. 2 $\frac{1}{2}$ d. for food, 5 $\frac{1}{2}$ d. for clothes and washing, and 3d. for lodging, and the number of persons thus maintained be estimated at 100000; what is the whole yearly cost, and how many labourers, at 18d. a-day wages, would earn the same sum in the same time?

33. There is a chain 22 yds. 0 ft. 3 in., which is contained exactly 266 times in a certain distance; and also another, which is only contained 265 times in the same distance. Find the distance in miles, furlongs, &c., and also the difference between the two chains.

34. How many parcels of 3 $\frac{1}{2}$ lbs. troy are there in 11 cwt. 1 qr. 20 lbs. avoirdupois?

35. A captain and 160 sailors took a prize worth £1547 18s. 4d., of which the captain had $\frac{1}{6}$ th for his share, and the rest was equally divided amongst the sailors; what was each man's share?

36. A clerk in the receipt of £120 a-year, is charged an income-tax at the rate of 5*d.* in the pound; by how much is his income diminished? And supposing that at the time this tax is imposed duties are repealed, so that tea (of which he consumes 1½ lbs. a month) becomes 9*d.* a lb. cheaper, and soap (of which he consumes 40 lbs. a year) 1½*d.* a lb. cheaper; is he a gainer or loser by the change, and by how much?

37. If £100 be distributed to wounded soldiers, ½ to privates at 4*s. 2d.* each, and ¼ to corporals at 6*s. 8d.* each; amongst how many men will it be divided?

38. A master and 72 men dug up together 9040 ounces of gold; supposing the price of gold to be £3 2*s. 7½d.* per ounce, and that the master had ½*th* for his share, whilst the rest was equally divided among the men, what was each man's gain?

39. A person who spends on an average 8*s. 7½d.* per day, discovers at the end of the year that he has exceeded his income by £7 15*s. 8¾d.*; what is his annual income, and by how much must he diminish his daily expenditure so as to compensate for the deficiency by the end of the next year (which is leap-year)?

40. In a detachment of troops, consisting altogether of 1260 men, one-third part were cavalry; but after receiving a reinforcement of infantry, one-fifth part only of the increased detachment were cavalry; what was the strength of the reinforcement?

41. A stationer buys 36 reams of paper at 16*s. 6d.* per ream, and 84 reams at 17*s. 9d.* per ream; find his entire outlay, and the average price per ream.

42. Among how many men must £73 be divided, in order that the share of each may be £4 17*s. 4d.*? And among how many must £79 17*s. 6d.* be divided, in order that half of them may have 10*s. 7d.* each, and the other half 7*s. 2d.* each?

43. Three-fifths of a certain number of persons received 5*s. 2d.* each, and the rest received 3*s. 8d.* each; the whole sum divided was £205 10*s.*; how many persons were there?

44. A farmer pays in wages every week £22 10*s.*; to each man he pays 12*s. 6d.*, and to each boy 5*s.*; he employs twice as many men as boys; how many of each are there?

45. Rations of 6lbs. 8 oz. and 10lbs. 3 oz., in the ratio of 5 of the former to 4 of the latter, are to be cut out of 147 cwt. 3 qrs. 6½ lbs. of beef; how many of each sort will there be?

46. A bag contains a certain number of sovereigns, 3 times as many

shillings, and 4 times as many pence, and the whole sum in the bag is £280 ; find how many sovereigns, shillings, and pence it contains respectively.

47. There are in a manufactory a certain number of workmen who receive 50s. a week ; twice as many who receive 31s. 6d. a week, and 11 times as many who receive 14s. a week ; and the total amount of the workmen's wages for one week is £93 9s. ; find the number of workmen.

48. At a certain public meeting, at which there were 6 ladies present to every 5 gentlemen, a subscription was made for a certain purpose, each gentleman contributing 7s. 6d. and each lady 5s. ; the whole sum collected was £756 ; how much money was subscribed by ladies, and how much by gentlemen ?

49. If £433 7s. be paid in crowns, half-crowns, shillings, and six-pences, in equal numbers, how many coins of each species will there be ?

50. If the toll-keeper at Waterloo Bridge received in one day £36 5s. 8d. ; omnibuses paying 4d., cabs 2d., ridden horses 1*l*., and foot-passengers $\frac{1}{2}$ d. each ; whilst for every omnibus there passed 2 ridden horses, 6 cabs, and 20 foot-passengers ; find how many of each passed in the day.

51. Two-thirds of a certain number of persons received eighteen pence each, and one-third received half-a-crown each ; if the whole sum distributed was £2 15s., how many persons were there ?

52. Divide £11 5s. 10d. between three persons in such a manner that one of them shall receive three times as much as either of the others.

53. In the allied army of 150,000 men, there are 6 French to every 5 English, 5 English to every 4 Turks, and 4 Turks to every Sardinian ; how many are there of each ?

54. The price of a season ticket to the Great Exhibition of 1851, was for ladies two guineas, and for gentlemen three guineas ; now if on any given day the gentlemen's tickets disposed of were twice as many as the ladies' tickets, and the whole sum received £840, how many tickets were sold on that day ?

55. At a public ball there were 6 gentlemen to 5 ladies ; the gentlemen's tickets were $1\frac{1}{2}$ guineas each, and the ladies' 1 guinea each ; the net proceeds, after deducting £470 for expenses, were £1000 ; how many ladies and gentlemen were there ?

56. If 100 quarters of wheat are sold for 77*s.* 8*d.* per quarter, and 50 quarters for 78*s.* 3*d.* per quarter, what is the average price per bushel?

57. A person's average annual expenditure from the year 1830 to the year 1850 inclusive, is £391 9*s.* 2*d.*; he finds that in 1830 he spent £391 16*s.* and that in 1851 he spent £445 8*s.* 9*d.*; what was his average annual expenditure from 1831 to 1851 inclusive?

58. A poultreer sold

17½	brace of partridges,	at	4 <i>s.</i> 9½ <i>d.</i>	per brace;
13½	... pheasants,	at	7 <i>s.</i> 9 <i>d.</i>	...
15½	... widgeon,	at	6 <i>s.</i> 7 <i>d.</i>	...
11½	... ptarmigan,	at	5 <i>s.</i> 6 <i>d.</i>	...
19½	... plovers,	at	2 <i>s.</i> 8½ <i>d.</i>	...
9½	... grouse,	at	8 <i>s.</i> 9 <i>d.</i>	...
13½	dozens of pigeons,	at	15 <i>s.</i> 6 <i>d.</i>	per dozen;
23½	couples of guinea fowls,	at	2 <i>s.</i> 9¾ <i>d.</i>	each.

Find the whole sum realised, and the average price per bird.

59. A clerk having to pay 1000 workmen £1 5*s.* 4½*d.* each, receives from his employer £1000 for this purpose, and this, together with £9 18*s.* 6*d.* of his own, he expends in paying each man in full as far as the money goes; how many men remain unpaid?

60. The price of a book which comes out in parts is £2 6*s.* 8*d.*; but if the price of each part were 13*d.* more than it is, the price of the book would be £3 7*s.* 6*d.*; how many parts are there?

61. A man buys 25 sheep for £36, and 30 more for £46; what will he gain or lose by selling them at £1 10*s.* 6*d.* apiece?

62. A farmer buys 100 cattle at £9 each; and after feeding off 60 acres of turnips, and giving them £150 worth of hay, he sells them again at £15 each; how much does he make per acre by his turnips?

63. A merchant bought 714 gallons of rum at 11*s.* 1*d.* per gallon; and after mixing with it 100 gallons of rum at 12*s.* per gallon, and 100 gallons of water, he retailed the whole at 2*s.* 11*d.* per quart; how much did he gain by this transaction?

64. A wine-merchant bought 63 gallons of brandy for £67 14*s.* 6*d.*, and then added 7 gallons of water; at what price per gallon must he sell the mixture so as to gain £15 8*s.* by the transaction?

65. If I send to a merchant abroad 267 tons 19 cwt. of iron work worth £12 per ton, and he returns me 3113 gallons of wine worth

13s. $2\frac{1}{2}$ d. per gallon; how much money does he still owe me on that account?

66. A grocer expended £1540 in the purchase of a certain quantity of tea at 3 cwt. for £70, and twice as much at 3 cwt. for £80; if he retail the whole at the rate of 6 cwt. for £150, what will he gain or lose?

GREATEST COMMON MEASURE.

Ex. X.

Find the Greatest Common Measure of—

- | | |
|---------------------------|-------------------------------------|
| 1. 336 and 1736. | 11. 1407, 3015, and 4020. |
| 2. 2075 and 11390. | 12. 6831, 5967, and 4692. |
| 3. 2982 and 2765. | 13. 8277, 10947, and 11303. |
| 4. 31137 and 14065. | 14. 5187, 5850, and 1339. |
| 5. 47005 and 14433. | 15. 3384, 8272, and 7567. |
| 6. 3888 and 5572. | 16. 62527, 57815, and 30318. |
| 7. 236511 and 37499. | 17. 15768, 16644, and 36865. |
| 8. 21672 and 24060. | 18. 18, 96, 120, and 3720. |
| 9. 133767 and 219207. | 19. 8787, 11658, 15022, and 20648. |
| 10. 8185736 and 20578792. | 20. 32136, 24245, 12051, and 16445. |

LEAST COMMON MULTIPLE.

Ex. XI.—CASE I.

Find the Least Common Multiple of—

1. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12.
2. 2, 4, 6, 8, 10, 12, 14, 16, 18, 20.
3. 8, 9, 12, 15, 16, 20, 27.
4. 120, 140, 168, 210.
5. 26, 28, 30, 32, 34, 36, 39.
6. 9, 10, 11, 12, 13, 14, 15, 16.
7. 3, 7, 9, 15, 36, 40, 63.
8. 48, 81, 32, 28, 44, 110, 165.
9. 2, 5, 8, 15, 18, 24, 36, 54.
10. 4, 9, 11, 36, 48, 56, 144.
11. 17, 22, 25, 33, 85, 136, 187.
12. 16, 20, 24, 30, 72, 100, 125.

13. 7, 11, 42, 27, 90, 154, 720.
14. 250, 360, 49, 700, 135, 560.
15. 21, 12, 6, 7, 48, 28, 63.
16. 24, 105, 180, 96, 336, 84.

Ex. XII.—CASE II.

Find the Least Common Multiple of—

- | | |
|---------------------------|------------------------------------|
| 1. 5115 and 8415. | 13. 4864, 15616, and 1904. |
| 2. 23997 and 6327. | 14. 4410, 7350, and 7875. |
| 3. 273, 325, and 364. | 15. 2835, 4680, and 68040. |
| 4. 819, 832, and 858. | 16. 10302, 10403, and 10506. |
| 5. 756, 814, and 935. | 17. 2231, 2425, and 2775. |
| 6. 288, 504, and 792. | 18. 11934, 12852, and 13804. |
| 7. 552, 575, and 675. | 19. 6097, 9737, and 7169. |
| 8. 972, 1826, and 2057. | 20. 312, 408, 285, and 345. |
| 9. 5184, 6912, and 3456. | 21. 1333, 1829, 3348, and 15222. |
| 10. 5325, 8307, and 3775. | 22. 1610, 6555, 1978, and 17157. |
| 11. 5865, 7429, and 7695. | 23. 3007, 2573, 4067, and 56357. |
| 12. 6831, 5967, and 4692. | 24. 225, 255, 1023, 289, and 4095. |

25. Find the least number of pounds which can be paid in either half-crowns or guineas.

VULGAR FRACTIONS.

Ex. XIII.—REDUCTION OF FRACTIONS TO THEIR LOWEST TERMS.

Reduce—

1. $\frac{209}{380}$	7. $\frac{4123}{351386}$	13. $\frac{428108}{586749}$
2. $\frac{1344}{1536}$	8. $\frac{19557}{156933}$	14. $\frac{147785}{176990}$
3. $\frac{2993}{3321}$	9. $\frac{96085}{113655}$	15. $\frac{10244}{103288}$
4. $\frac{6327}{23997}$	10. $\frac{120916}{133988}$	16. $\frac{16287}{67818}$
5. $\frac{13786}{93208}$	11. $\frac{108338}{119742}$	17. $\frac{10767}{203021}$
6. $\frac{6902}{8265}$	12. $\frac{286714}{999999}$	18. $\frac{519176}{692671}$

Ex. XIV.—REDUCTION OF MIXED NUMBERS.

Reduce to Improper Fractions :

1. $1\frac{1}{3}$	5. $5\frac{7}{8}$	9. $49\frac{2}{7}$
2. $4\frac{8}{10}$	6. $8\frac{5}{12}$	10. $3491\frac{2}{3}$
3. $2\frac{14}{18}$	7. $3\frac{4}{9}$	11. $5270\frac{4}{11}$
4. $5\frac{7}{150}$	8. $6\frac{11}{67}$	12. $196\frac{11}{133}$

Ex. XV.—REDUCTION OF IMPROPER FRACTIONS.

Reduce to Mixed Numbers :

1. $\frac{210}{107}$	5. $\frac{3327}{212}$	9. $\frac{13183}{116}$
2. $\frac{168}{143}$	6. $\frac{20765}{546}$	10. $\frac{223778}{467}$
3. $\frac{5832}{1885}$	7. $\frac{61177}{1035}$	11. $\frac{2830407}{1364}$
4. $\frac{43260}{4783}$	8. $\frac{616979}{7013}$	12. $\frac{6609878}{7369}$

Ex. XVI.—REDUCTION OF FRACTIONS TO THEIR LEAST COMMON DENOMINATOR.

Reduce to their Least Common Denominator :

1. $\frac{7}{12}, \frac{5}{6}, \frac{3}{4}, 2, \frac{5}{3}$.	6. $\frac{1}{15}, \frac{1}{18}, \frac{2}{3}, \frac{5}{6}, \frac{17}{11}$.
2. $\frac{3}{8}, \frac{5}{12}, \frac{4}{9}, \frac{7}{20}, 6$.	7. $\frac{7}{12}, \frac{5}{16}, \frac{8}{21}, \frac{1}{6}, \frac{23}{3}$.
3. $\frac{7}{15}, \frac{1}{15}, \frac{2}{3}, \frac{1}{12}, \frac{2}{5}$.	8. $\frac{5}{8}, \frac{3}{5}, \frac{1}{3}, \frac{7}{12}, \frac{4}{5}$.
4. $\frac{2}{3}, \frac{4}{15}, \frac{16}{45}, \frac{2}{21}, 1$.	9. $\frac{3}{4}, \frac{1}{15}, \frac{7}{6}, \frac{5}{3}, \frac{17}{15}$.
5. $\frac{3}{8}, \frac{5}{12}, \frac{2}{3}, \frac{7}{15}, \frac{1}{18}$.	10. $\frac{27}{48}, \frac{1}{18}, \frac{2}{3}, \frac{17}{12}, \frac{2}{21}$.

Ex. XVII.—REDUCTION OF COMPOUND FRACTIONS.

Reduce to Simple Fractions :

1. $\frac{8}{5}$ of $\frac{27}{28}$.	7. $\frac{8}{5}$ of $\frac{5}{4}$ of $\frac{3}{2}$ of $\frac{8}{3}$ of $\frac{4}{3}$.
2. 16 of $\frac{7}{12}$.	8. $\frac{4}{5}$ of $\frac{1}{12}$ of $\frac{5}{3}$ of $\frac{4}{5}$ of $\frac{5}{6}$.
3. $5\frac{3}{4}$ of $2\frac{3}{5}$.	9. $7\frac{3}{5}$ of $13\frac{1}{2}$ of $\frac{5}{3}$ of $\frac{10}{11}$.
4. $39\frac{1}{5}$ of $4\frac{9}{10}$.	10. $9\frac{4}{5}$ of $\frac{1}{2}$ of $\frac{3}{4}$ of $\frac{5}{3}$ of $\frac{8}{3}$.
5. $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{4}{3}$.	11. $6\frac{1}{3}$ of $\frac{5}{2}$ of $\frac{2}{3}$ of $\frac{5}{3}$ of $1\frac{3}{5}$.
6. $\frac{4}{5}$ of $\frac{3}{10}$ of $\frac{2}{3}\frac{2}{3}$.	12. $4\frac{4}{11}$ of $2\frac{5}{11}$ of $1\frac{1}{10}$ of $\frac{1}{3}\frac{1}{3}$.

ADDITION.

Ex. XVIII.

1. $\frac{1}{17} + \frac{2}{17} + \frac{3}{17} + \frac{4}{17} + \frac{5}{17} + \frac{6}{17}$.
2. $\frac{8}{5} + \frac{17}{24} + \frac{3}{8} + \frac{5}{12} + \frac{2}{3}$.
3. $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \frac{1}{32} + \frac{1}{64}$.
4. $13 + \frac{1}{8} + \frac{1}{16} + \frac{1}{32} + \frac{1}{64} + \frac{1}{128} + \frac{1}{256}$.
5. $8\frac{1}{2} + 7\frac{7}{15} + 1\frac{9}{25} + 15 + 4\frac{1}{3} + 2\frac{3}{8}$.
6. $3\frac{7}{20} + 8\frac{4}{37} + 5\frac{1}{11} + 1 + \frac{1}{5} + 7\frac{1}{15}$.
7. $11\frac{1}{2} + 5\frac{1}{2} + 117 + 6\frac{1}{8} + 5\frac{3}{88} + 9\frac{21}{184}$.
8. $7\frac{3}{8} + 11\frac{3}{8} + 2\frac{5}{14} + 16\frac{3}{8} + 9\frac{1}{16} + 1\frac{1}{2}\frac{6}{7}$.
9. $6\frac{1}{11} + 4\frac{1}{2} + 1 + 8\frac{2}{35} + 17\frac{3}{8} + 53\frac{1}{21}$.
10. $9\frac{1}{8} + 11\frac{3}{8} + 2 + 14\frac{3}{8} + 101\frac{1}{8} + 27\frac{1}{12}$.
11. $12\frac{1}{8} + 14\frac{2}{8} + 6\frac{3}{8} + 7 + 1\frac{1}{8} + 8\frac{5}{11}$.
12. $6\frac{1}{8} + 1\frac{5}{33} + 13\frac{1}{24} + 4\frac{1}{5} + 5\frac{1}{8} + 4\frac{1}{33}$.
13. $9\frac{6}{80} + 1\frac{1}{825} + 4\frac{1}{4} + 5\frac{3}{40} + 17 + 2\frac{1}{125}$.
14. $3\frac{8}{21} + 7\frac{3}{41} + 14\frac{8}{61} + 9 + 6\frac{7}{217} + 15\frac{1}{31}$.
15. $1\frac{1}{80} + 2\frac{9}{4} + 3 + 4\frac{8}{34} + 5\frac{7}{88} + 6\frac{8}{9}$.
16. $275\frac{1}{2} + 1343\frac{1}{2} + 569\frac{1}{4} + 4\frac{1}{8} + \frac{1}{8}$ of 2767.
17. $24\frac{1}{2} + 41\frac{1}{2} + 6\frac{1}{4} + 8\frac{1}{8} + \frac{1}{2}$ of $\frac{3}{2}$ of $\frac{1}{2}$.
18. $387\frac{1}{2} + 285\frac{1}{4} + 394\frac{1}{2} + 351\frac{1}{8} + \frac{1}{2}$ of 3704.
19. $\frac{1}{18} + 4\frac{3}{8} + \frac{1}{16} + \frac{1}{8}$ of $2\frac{3}{4} + \frac{1}{2}$ of $\frac{5}{8}$ of $\frac{1}{2}$.
20. $2 + \frac{3}{2} + \frac{1}{3} + \frac{5}{4} + \frac{1}{6} + \frac{7}{8} + \frac{1}{2} + \frac{3}{8} + \frac{1}{9} + \frac{1}{10}$.

	<i>£</i>	<i>s.</i>	<i>d.</i>		<i>£</i>	<i>s.</i>	<i>d.</i>
21.	4	. 16	. 10 $\frac{1}{2}$	22.	437	. 19	. 6 $\frac{2}{3}$
	38	. 0	. 11 $\frac{3}{8}$		207	. 18	. 11 $\frac{5}{8}$
	5	. 3	. 6 $\frac{1}{2}$		596	. 12	. 3 $\frac{7}{8}$
	69	. 19	. 4 $\frac{1}{2}$		857	. 13	. 10 $\frac{9}{10}$
	185	. 14	. 5 $\frac{1}{8}$		765	. 8	. 9 $\frac{1}{2}$

	tons.	cwt.	qrs.	lbs.		ac.	ro.	po.
23.	14	. 11	. 1	. 23 $\frac{9}{10}$	24.	878	. 3	. 15 $\frac{1}{3}$
	23	. 19	. 3	. 25 $\frac{11}{12}$		907	. 1	. 37 $\frac{1}{4}$
	1	. 4	. 2	. 14 $\frac{1}{8}$		711	. 0	. 2 $\frac{5}{8}$
	15	. 12	. 0	. 27 $\frac{7}{8}$		854	. 2	. 29 $\frac{7}{8}$
	79	. 15	. 1	. 18 $\frac{1}{4}$		137	. 3	. 15 $\frac{1}{4}$

SUBTRACTION.

Ex. XIX.—CASE I.

1. $11\frac{2}{3} - 6\frac{5}{6}$.	11. $6\frac{3}{8} - 2\frac{5}{2}\frac{1}{2}$.
2. $18\frac{3}{4} - 9\frac{3}{4}$.	12. $9 - \frac{1}{16}$.
3. $14 - 7\frac{5}{14}$.	13. $1\frac{1}{2} - \frac{1}{2}\frac{1}{4}$.
4. $17\frac{8}{5} - 8\frac{4}{5}$.	14. $12\frac{17}{65} - 8\frac{1}{105}$.
5. $49\frac{5}{11} - 13\frac{4}{11}$.	15. $8\frac{1}{6} - 2\frac{3}{8}$.
6. $26\frac{3}{8} - 15\frac{9}{35}$.	16. $23 - 11\frac{7}{24}$.
7. $19 - 12\frac{2}{3}$.	17. $18\frac{6}{85} - 4\frac{3}{115}$.
8. $8\frac{3}{4} - 7\frac{1}{4}$.	18. $24\frac{19}{10} - 13\frac{17}{35}$.
9. $16\frac{3}{14} - 12\frac{3}{35}$.	19. $101\frac{7}{15} - \frac{1}{4}$ of 99.
10. $\frac{3}{7} - \frac{13}{1800}$.	20. $8\frac{1}{15} - \frac{2}{25}$ of 7.
<i>£ s. d.</i>	<i>£ s. d.</i>
21. $187 . 11 . 7\frac{1}{4}$	22. $201 . 1 . 6\frac{5}{6}$
<u>$92 . 19 . 7\frac{1}{2}\frac{1}{3}$</u>	<u>$23 . 18 . 11\frac{11}{12}\frac{1}{6}$</u>
cwt. qrs. lbs. oz.	yds. ft. in.
23. $25 . 0 . 17 . 13\frac{4}{25}$	24. $49 . 1 . 7\frac{8}{25}$
<u>$12 . 3 . 25 . 15\frac{1}{4}$</u>	<u>$17 . 2 . 11\frac{16}{243}$</u>

Ex. XX.—CASE II.

- $2\frac{1}{6} + 3\frac{7}{24} - 4\frac{7}{15} - 2\frac{11}{30} + 1\frac{3}{4}$.
- $3\frac{4}{33} - 7\frac{5}{39} + 4\frac{6}{27} - 1\frac{1}{3} + \frac{10}{9}$.
- $\frac{8}{15} + 1\frac{3}{7} - 9\frac{1}{12} + 15\frac{6}{35} - 2\frac{7}{10}$.
- $3\frac{3}{8} - 4\frac{5}{6} + 6\frac{7}{10} - 1\frac{3}{15} + 2\frac{3}{10}$.
- $2\frac{1}{6} + \frac{7}{10} + 1\frac{1}{14} - \frac{1}{15} + 5\frac{1}{12}$.
- $2\frac{13}{12} + 3\frac{3}{8} + 7 - 4\frac{9}{145} + 1\frac{1}{10}$.
- $5\frac{1}{6} - \frac{7}{52} + 10\frac{2}{39} - 3\frac{1}{4} + \frac{7}{25}$.
- $2 - 3\frac{7}{8} + 5\frac{3}{8} - 7\frac{1}{8} + 9\frac{1}{4}$.
- $7\frac{8}{15} - 2\frac{1}{6} + 3\frac{7}{15} - 1\frac{5}{6} - 6\frac{3}{8} + 11\frac{6}{7}$.
- $10\frac{3}{8} - 9\frac{1}{3} + 7 + 8\frac{6}{5} - 1\frac{5}{18} - 6\frac{11}{6}$.
- $8\frac{6}{45} - 3\frac{7}{4} + 2\frac{9}{35} - 1\frac{3}{4} - 3\frac{9}{14} + 5\frac{5}{8}$.
- $1\frac{1}{3} + 3\frac{2}{5} - 7\frac{1}{2} - 5\frac{7}{6} + 12\frac{3}{8} + 2\frac{5}{6}$.
- $24\frac{7}{8} - \frac{1}{3} + 36\frac{3}{4} - \frac{5}{12} + 1\frac{2}{3} - 55\frac{3}{8}$.
- $16\frac{6}{5} - 11\frac{1}{50} + 13\frac{1}{12} + 2\frac{3}{4} - 15 - 1\frac{4}{35}$.
- $5\frac{7}{8} - 11\frac{3}{14} + 12\frac{10}{19} - 4\frac{6}{5} - \frac{1}{3} + 14\frac{3}{2}$.
- $11\frac{13}{68} - 9\frac{29}{108} + 7\frac{17}{185} - 5\frac{45}{235} - 3\frac{61}{155} + 1$.

MULTIPLICATION.

Ex. XXI.

1. Multiply $21\frac{1}{4}$, $6\frac{5}{8}$, and $19\frac{5}{6}$.
2. Multiply 2347 by $16\frac{1}{12}$, $5\frac{2}{3}$, and $73\frac{4}{11}$.
3. $\frac{18}{105} \times \frac{84}{369} \times \frac{205}{156}$.
4. $\frac{140}{363} \times \frac{14}{5} \times \frac{15}{54} \times \frac{151}{170}$.
5. $\frac{504}{750} \times \frac{83}{360} \times \frac{545}{56} \times 2\frac{14}{143}$.
6. $123\frac{1}{4} \times 26\frac{5}{8} \times 79\frac{11}{15} \times 3\frac{5}{36}$.
7. $\frac{13}{13} \times \frac{51}{5} \times \frac{7}{5} \times \frac{31}{9} \times \frac{27}{56} \times \frac{7}{44}$.
8. $\frac{133}{400} \times \frac{48}{1} \times \frac{143}{14} \times \frac{201}{136} \times \frac{37}{33}$.
9. $\frac{123}{1125} \times 26\frac{89}{120} \times 9\frac{1}{6} \times 2\frac{63}{110} \times 7\frac{8}{91} \times 1\frac{21}{665}$.
10. $\frac{2}{5} \times 5\frac{1}{2} \times 6 \times 11\frac{6}{5} \times \frac{3}{28} \times 14\frac{1}{7}$.
11. $\frac{5}{3} \times 1\frac{1}{25} \times 1\frac{13}{56} \times 1\frac{11}{63} \times 8\frac{15}{16} \times 4\frac{9}{37}$.
12. $1\frac{1}{60} \times 9\frac{9}{11} \times 2\frac{19}{27} \times 1\frac{1}{6} \times 4\frac{1}{7} \times 1\frac{1}{2} \times 1\frac{6}{7} \times 2\frac{4}{15}$.

DIVISION.

Ex. XXII.

- | | |
|---|---|
| 1. $1\frac{5}{94} \div \frac{5}{4}$. | 6. $16\frac{8}{9} \div \frac{2}{3}$ of $7\frac{5}{6}$. |
| 2. $1\frac{7}{16} \div 2\frac{3}{10}$. | 7. $\frac{2}{3}$ of $1\frac{2}{5}$ of $12\frac{1}{2} \div 6\frac{2}{3}$. |
| 3. $6\frac{15}{16} \div 4\frac{5}{8}$. | 8. $4\frac{2}{3}$ of $2\frac{1}{4} \div 7\frac{1}{2}$ of $19\frac{1}{5}$. |
| 4. $9\frac{1}{5} \div \frac{2}{3}$ of 7 . | 9. $\frac{4}{5}$ of $1\frac{16}{13}$ of $\frac{27}{20} \div \frac{3}{4}$ of $1\frac{8}{5}$ of $\frac{2}{3}$. |
| 5. $2911\frac{4}{5} \div 92\frac{3}{5}$. | 10. $\frac{2}{3}$ of $1\frac{4}{5}$ of $\frac{5}{6} \div 3\frac{3}{4}$ of $2\frac{2}{5}$ of $\frac{3}{5}$. |

SIMPLIFICATION OF MIXED FRACTIONAL EXPRESSIONS.

Ex. XXIII.

Reduce to their simplest forms :

1. $\frac{\frac{5}{8}}{\frac{8}{9}} ; \frac{8\frac{3}{4}}{3\frac{8}{9}} ; \frac{206\frac{1}{4}}{240} ; \frac{35}{71\frac{1}{3}} ; \frac{3\frac{1}{4}}{5\frac{7}{7}}$ of $4\frac{3}{5}$.
2. $\frac{21\frac{7}{8}}{\frac{9}{4} + \frac{5}{6}} ; \frac{7\frac{1}{3} + 4\frac{1}{2}}{3\frac{1}{3} \cdot 4\frac{1}{2}} ; \frac{2\frac{1}{2} + \frac{1}{6}}{3\frac{1}{2} - \frac{1}{6}} ; \frac{4\frac{1}{7} - 2\frac{1}{4}}{6\frac{1}{2} - 2\frac{1}{7}}$
3. $\frac{3\frac{1}{2} + 2\frac{1}{4} + 4\frac{1}{3}}{4\frac{1}{3} + 9\frac{1}{4} - 1\frac{1}{2}} ; \frac{2\frac{1}{2} + 3\frac{1}{4} \times 4\frac{1}{6}}{5\frac{1}{2} \times 1\frac{9}{11} - 3\frac{3}{4}}$

4. $\frac{\frac{5}{6} \text{ of } \frac{2}{3} \text{ of } 13\frac{1}{2}}{\frac{1}{6} \text{ of } \frac{2}{3} + 34}; \quad \frac{4\frac{1}{3} \times 4\frac{1}{3} \times 4\frac{1}{3} - 1}{4\frac{1}{3} \times 4\frac{1}{3} - 1}$
5. $\frac{1 - \frac{3}{10} \text{ of } \frac{1}{3} \text{ of } \frac{1\frac{6}{7}}{2\frac{3}{4}}}{2 - \frac{3}{5} \text{ of } \frac{1}{4} \text{ of } \frac{1\frac{6}{7}}{1\frac{1}{2}}}; \quad \frac{\frac{2}{3} \text{ of } \frac{4}{5} - \frac{1}{6} \times \frac{10}{9}}{3\frac{1}{3} - 2\frac{5}{6}}$
6. $\frac{\frac{1}{2} \cdot \frac{1}{2} - 1}{2}, \quad \frac{\frac{1}{2} - 2}{3}, \quad \frac{\frac{1}{2} + \frac{1}{3} + \frac{1}{4}}{\frac{1}{2\frac{1}{2}} + \frac{1}{3\frac{1}{2}} + \frac{1}{4\frac{1}{2}}}$
7. $\frac{1}{2 + \frac{1}{2 + \frac{1}{2}}}; \quad \frac{1}{3 + \frac{1}{7 + \frac{1}{16}}}; \quad \frac{2}{3 + \frac{4}{5 + \frac{4}{7}}}$
8. $\frac{6}{7 + \frac{1}{8 + \frac{1}{9}}}; \quad \frac{1}{2 + \frac{1}{3 + \frac{1}{4 + \frac{1}{5}}}}; \quad 2\frac{1}{2} + \frac{1}{3\frac{1}{3} + \frac{1}{4\frac{1}{4}}}$
9. $\frac{\frac{1}{2} \cdot \frac{1}{2} - 1}{2}, \quad \frac{\frac{1}{2} - 2}{3}, \quad \frac{\frac{1}{2} - 3}{4}, \quad \frac{\frac{1}{2} - 4}{5}$
10. $\frac{\frac{3\frac{3}{8}}{8} \text{ of } 6\frac{1}{4}}{1\frac{1}{3}} - \frac{\frac{4\frac{7}{8}}{8} \text{ of } 3\frac{8}{13}}{2\frac{1}{3}}$
11. $\frac{3 \times 4\frac{8}{9}}{7\frac{1}{2} \text{ of } 4\frac{8}{9}} + \frac{\frac{3\frac{3}{8}}{8} \text{ of } 8\frac{5}{6}}{3\frac{7}{9} - 2\frac{1}{6}}$
12. $\frac{\frac{2}{3} \text{ of } \frac{5}{7} + 9}{7} + \frac{\frac{2}{3} \frac{5}{7}}{2\frac{1}{3}}$
13. $\frac{5 \frac{1}{2} - \frac{1}{3}}{\frac{1}{2} + \frac{1}{3}} \text{ of } \frac{3\frac{1}{4}}{4\frac{1}{3}} \div \frac{2\frac{3}{8}}{6\frac{1}{2}}$
14. $\frac{\frac{3}{2} \text{ of } \frac{4\frac{1}{8}}{5\frac{1}{7}} - \frac{2}{3} \text{ of } \frac{7\frac{1}{5}}{5\frac{1}{7}}}{4\frac{1}{12}} \times \frac{\frac{4\frac{1}{8}}{8}}{5\frac{1}{4} - 2\frac{1}{2}}$
15. $\frac{\frac{7}{15} \text{ of } \frac{5}{2}}{15\frac{1}{4}} \times \frac{21}{16\frac{2}{3}} \times \frac{39\frac{2}{7}}{7} \times \frac{1\frac{1}{3}}{\frac{4}{5} \text{ of } 16\frac{2}{3}}$
16. $\frac{2+3}{4+5} \div \frac{4+3\frac{1}{2}}{5+5\frac{1}{2}}; \quad \frac{4\frac{8}{11}}{7\frac{3}{10}} \div \frac{1\frac{7}{22}}{17\frac{2}{5}}; \quad \frac{48\frac{4}{7}}{1085\frac{7}{10}} \div \frac{7\frac{3}{11}}{174\frac{3}{17}}$
17. $(\frac{1}{2} + \frac{1}{3}) \times (\frac{1}{4} + \frac{1}{5}) - (\frac{1}{2} - \frac{1}{3}) \times (\frac{1}{4} - \frac{1}{5})$
18. $\begin{cases} (\frac{1}{2} + \frac{1}{3}) \times (\frac{1}{4} - \frac{1}{5}) \div \frac{1}{6} - \frac{1}{7}; \\ (\frac{1}{2} + \frac{1}{3}) \times (\frac{1}{4} - \frac{1}{5}) \div (\frac{1}{6} - \frac{1}{7}). \end{cases}$
19. $(11\frac{1}{32} - 10\frac{2}{45}) \times (1\frac{4}{11} + 1\frac{6}{11})$
20. $(3\frac{3}{8} + 4\frac{1}{3}) \div (7\frac{1}{15} - 2\frac{3}{4})$
21. $(7\frac{5}{8} + \frac{3}{7} - 5\frac{1}{6}) \times (4\frac{1}{6} - 3\frac{2}{7})$
22. $(6\frac{1}{3} - 3\frac{5}{9} + 2\frac{7}{8}) \div (7\frac{1}{5} - 3\frac{2}{3} + 8\frac{3}{20})$.

23. $\left\{ \begin{array}{l} \frac{3}{4} \times \frac{2}{3} + \frac{1}{3} \div 5\frac{1}{2} - \frac{7}{20}; \\ \frac{3}{4} \times (\frac{2}{3} + \frac{1}{3} \div 5\frac{1}{2}) - \frac{7}{20}. \end{array} \right.$
24. $(11\frac{3}{4} + 4\frac{2}{3} + 5\frac{5}{6}) \times (7\frac{7}{8} - 5\frac{2}{3}) \div (14\frac{1}{8} + 8\frac{1}{3}).$
25. $\frac{1}{2}\frac{2}{7}(1 - \frac{6}{5}\frac{1}{4}) + \frac{8}{11} \times \frac{1}{3} \times (\frac{1}{2} + \frac{5}{12}).$
26. $\frac{1}{5} + \frac{4}{7} \text{ of } \frac{1}{2} \times 1\frac{1}{4} \times (\frac{1}{11} - \frac{1}{3}).$
27. $8\frac{4}{5} + \frac{4}{7} + 3\frac{5}{6} \text{ of } 8\frac{9}{10} - 14\frac{3}{8} \div 4\frac{1}{3}.$
28. $1\frac{1}{2} + \frac{8}{5} \text{ of } \frac{3}{4} + \frac{4}{5\frac{1}{10}}.$
29. $(\frac{2}{15} + \frac{1}{3}) \div (3 - \frac{1}{3}) \times (\frac{1}{3} + 2\frac{1}{6}).$
30. $\frac{\frac{1}{2}\frac{2}{8} - \frac{1}{15} + \frac{3}{11} + \frac{1}{110} - \frac{8}{35}}{(\frac{1}{8} + \frac{1}{12}) \times (\frac{1}{2} - \frac{1}{3})}$
31. $(2\frac{1}{3} + 1\frac{1}{5} + 3\frac{1}{6}) \div \frac{1}{2} \text{ of } \frac{6}{5} \text{ of } 1\frac{5}{6}.$
32. $(1\frac{1}{2} + 2\frac{2}{3} + 3\frac{1}{6}) \div \frac{1}{3} \text{ of } \frac{6}{5} \text{ of } 2\frac{1}{4}.$
33. $\frac{2\frac{2}{17}}{1\frac{1}{17}} \div \frac{10}{107} \times \frac{10}{11} \div \frac{10}{115}.$
34. $(4 - 2\frac{1}{4}) \times (6\frac{1}{2} - 2\frac{1}{4}) + (2\frac{1}{2} + \frac{1}{3}) \div (3\frac{1}{2} - \frac{1}{3}).$
35. $\left\{ \begin{array}{l} 2\frac{1}{12} + 3\frac{5}{21} \text{ of } 6\frac{1}{4} - 3\frac{1}{4}; \\ (2\frac{1}{12} + 3\frac{5}{21}) \text{ of } 6\frac{1}{4} - 3\frac{1}{4}; \\ 2\frac{1}{12} + 3\frac{5}{21} \text{ of } (6\frac{1}{4} - 3\frac{1}{4}); \\ (2\frac{1}{12} + 3\frac{5}{21}) \text{ of } (6\frac{1}{4} - 3\frac{1}{4}). \end{array} \right.$
36. $(8\frac{2}{5} \text{ of } 1\frac{1}{17} + 2\frac{1}{14} \text{ of } 2\frac{1}{25} - 2\frac{1}{4} \div \frac{7}{16};$
 $(8\frac{2}{5} \text{ of } (1\frac{1}{17} + 2\frac{1}{14})) \text{ of } 2\frac{1}{25} - 2\frac{1}{4} \div \frac{7}{16}.$
37. $\frac{1}{2}\frac{9}{1} + 3\frac{1}{4} \text{ of } 1\frac{1}{17} + (\frac{3}{4} \div \frac{1}{3}) \text{ of } (2\frac{1}{2} - \frac{1}{4}) - \frac{11}{18}.$
38. $(4\frac{1}{3} - 2\frac{1}{4}) \times (7\frac{1}{3} + 2\frac{1}{15}) - (8\frac{1}{2} - 3\frac{1}{3}) + (2\frac{1}{4} - \frac{1}{15}) \div (\frac{1}{4} + \frac{1}{16}).$
39. $\left\{ \begin{array}{l} 2\frac{1}{4} + 3\frac{1}{3} \text{ of } 2\frac{5}{8} - 1\frac{7}{24} - \frac{1}{12}; \\ 2\frac{1}{4} + 3\frac{1}{3} \text{ of } (2\frac{5}{8} - 1\frac{7}{24} - \frac{1}{12}); \\ (2\frac{1}{4} + 3\frac{1}{3}) \text{ of } 2\frac{5}{8} - 1\frac{7}{24} - \frac{1}{12}; \\ (2\frac{1}{4} + 3\frac{1}{3}) \text{ of } (2\frac{5}{8} - 1\frac{7}{24} - \frac{1}{12}). \end{array} \right.$
40. $(\frac{1}{3} + \frac{2}{5} \text{ of } 1\frac{1}{11} - \frac{3}{8}\frac{3}{8}) \div (\frac{1}{2} - 1\frac{1}{4} + \frac{1}{2}\frac{9}{11}) - \frac{4}{5}\frac{1}{1}.$
41. $(1 + \frac{2}{3} + \frac{5}{6} + \frac{1}{16} - \frac{3}{5} \text{ of } \frac{6}{5} \text{ of } \frac{1}{20}) \times 5\frac{1}{18}.$
42. $(10\frac{1}{2} + 2\frac{2}{3} + \frac{4}{3}) \times 3\frac{4}{15} - 2\frac{2}{20} \div (\frac{1}{4} \text{ of } 21\frac{1}{6}).$
43. $\left\{ \begin{array}{l} 2\frac{1}{4} + 3\frac{1}{3} \text{ of } 5\frac{1}{14} - 4\frac{5}{21}; \\ 2\frac{1}{4} + 3\frac{1}{3} \text{ of } (5\frac{1}{14} - 4\frac{5}{21}); \\ (2\frac{1}{4} + 3\frac{1}{3}) \text{ of } 5\frac{1}{14} - 4\frac{5}{21}; \\ (2\frac{1}{4} + 3\frac{1}{3}) \text{ of } (5\frac{1}{14} - 4\frac{5}{21}). \end{array} \right.$
44. $\frac{1}{2}\frac{7}{8}(\frac{5}{6} - \frac{1}{2}) + \frac{6}{7} \text{ of } 1\frac{1}{4} \text{ of } (3\frac{3}{4} - 1\frac{5}{24}) - (2\frac{5}{6} - 1\frac{1}{14}) \div 2\frac{5}{8}.$
45. $\left\{ \begin{array}{l} (3\frac{1}{2} + 2\frac{1}{4}) \times (3\frac{1}{3} - 1\frac{1}{2} - 1\frac{1}{4}); \\ (3\frac{1}{2} + 2\frac{1}{4}) \times 3\frac{1}{3} - (1\frac{1}{2} - 1\frac{1}{4}); \\ (3\frac{1}{2} + 2\frac{1}{4}) \times (3\frac{1}{3} - 1\frac{1}{4}) - 1\frac{1}{4}; \\ 3\frac{1}{2} + 2\frac{1}{4} \times 3\frac{1}{3} - 1\frac{1}{2} - 1\frac{1}{4}. \end{array} \right.$

46. $\frac{\frac{2}{3} \times \frac{2}{3} + \frac{1}{2} \div 2\frac{1}{3}}{(\frac{1}{4} - \frac{1}{3}) \div (\frac{1}{2} + \frac{2}{3} \text{ of } 6)}$

47. $\left(\frac{1}{3} + \frac{2\frac{1}{3}}{5} \times \frac{53\frac{1}{4}}{\frac{9}{10}} \right) \div \frac{1}{6}$

48. $\left(\frac{9}{10\frac{1}{8}} + \frac{11\frac{1}{4}}{12} \times \frac{13\frac{1}{8}}{\frac{1}{4}\frac{1}{8}} \right) \div \frac{4}{3}$

49. $\frac{4\frac{7}{10} + 5\frac{9}{11} - 2\frac{2}{3}}{4\frac{7}{10} \text{ of } 5\frac{9}{11} \text{ of } 2\frac{2}{3}} - \frac{7}{8} \times \frac{9}{10} \times \frac{7}{4}$.

50. $2\frac{3}{4} - 5\frac{1}{8} \text{ of } \left(\frac{1}{3} + \frac{1}{3} - \frac{2\frac{1}{3}}{\frac{1}{3} - \frac{1}{4} - \frac{3}{4}} \right) + 4$.

51. $\frac{17\frac{1}{2}(5\frac{5}{8} + 3\frac{3}{4} - 1\frac{8}{5})}{5\frac{5}{8} \times 3\frac{3}{4} \times 1\frac{8}{5}} + \frac{2}{3} \div \frac{4}{5} \text{ of } \frac{5}{6} \text{ of } \frac{3\frac{1}{2}}{7\frac{1}{3}}$

52. $\frac{\left(\frac{3}{8} - \frac{1}{18} \right) \text{ of } \left(1\frac{3}{4} + \frac{1}{13} \right)}{\frac{3}{8} - \frac{1}{18} \text{ of } \frac{1}{4} + \frac{1}{13}}$

53. $\frac{6\frac{1}{3} - 3\frac{3}{8}}{6\frac{1}{3} + 3\frac{3}{8}} + \frac{1\frac{1}{8}}{11\frac{1}{4}} \text{ of } 2 + \frac{1}{3} \text{ of } \frac{\frac{1}{2}}{6\frac{1}{2}}$

54. $\frac{7\frac{1}{2} + 11\frac{1}{2} - 2\frac{2}{3}}{6\frac{3}{5} + 11\frac{1}{2} + 2\frac{2}{3}} \times 10\frac{9}{13} - 7\frac{1}{8}$.

55. $\left\{ \begin{array}{l} 1\frac{1}{2} + \frac{3\frac{1}{2} - \frac{1}{4}}{3\frac{1}{2} + \frac{1}{4}} - 2\frac{2}{5} \text{ of } \frac{1}{13} - \frac{6}{7}; \\ 1\frac{1}{2} + \frac{3\frac{1}{2} - \frac{1}{4}}{3\frac{1}{2} + \frac{1}{4}} - 2\frac{2}{5} \text{ of } \left(\frac{1}{13} - \frac{6}{7} \right); \\ 1\frac{1}{2} + \left(\frac{3\frac{1}{2} - \frac{1}{4}}{3\frac{1}{2} + \frac{1}{4}} - 2\frac{2}{5} \right) \text{ of } \frac{1}{13} - \frac{6}{7}. \end{array} \right.$

56. $7\frac{1}{2}\frac{8}{5} + \frac{8\frac{1}{5} + \frac{1}{2}}{11\frac{1}{3} + 5\frac{1}{4}} - \frac{7}{45} \text{ of } 6\frac{1}{2} \text{ of } (1\frac{1}{3} + 3\frac{1}{15})$.

57. $\left\{ \begin{array}{l} 2\frac{1}{2} + \frac{3\frac{1}{4}}{4} - 2\frac{1}{2} \text{ of } \frac{4}{5} + \frac{\frac{1}{2} - \frac{1}{3}}{\frac{1}{2} + \frac{1}{3}} \text{ of } \frac{1}{2}; \\ 2\frac{1}{2} + \left(\frac{3\frac{1}{4}}{4} - 2\frac{1}{2} \right) \text{ of } \frac{4}{5} + \frac{\frac{1}{2} - \frac{1}{3}}{\frac{1}{2} + \frac{1}{3}} \text{ of } \frac{1}{2}; \\ (2\frac{1}{2} + \frac{3\frac{1}{4}}{4} - 2\frac{1}{2}) \text{ of } \frac{4}{5} + \frac{\frac{1}{2} - \frac{1}{3}}{\frac{1}{2} + \frac{1}{3}} \text{ of } \frac{1}{2}; \\ 2\frac{1}{2} + \frac{3\frac{1}{4}}{4} - 2\frac{1}{2} \text{ of } \left(\frac{4}{5} + \frac{\frac{1}{2} - \frac{1}{3}}{\frac{1}{2} + \frac{1}{3}} \text{ of } \frac{1}{2} \right); \\ 2\frac{1}{2} + \left(\frac{3\frac{1}{4}}{4} - 2\frac{1}{2} \right) \text{ of } \left(\frac{4}{5} + \frac{\frac{1}{2} - \frac{1}{3}}{\frac{1}{2} + \frac{1}{3}} \text{ of } \frac{1}{2} \right). \end{array} \right.$

58. $\frac{1\frac{1}{2} + 1\frac{2}{3}}{3\frac{3}{4}} - \frac{17\frac{1}{2}}{16\frac{1}{3}} + \frac{2\frac{1}{4} + 6\frac{1}{4}}{7\frac{1}{2} - 4\frac{1}{3}}$ of $2 \div \frac{7\frac{1}{4}}{6\frac{1}{6}}$

59. $1\frac{1}{2} + \frac{3\frac{1}{2} - \frac{1}{4}}{3\frac{1}{2} + \frac{1}{4}} - 2\frac{3}{5}$ of $\frac{1}{13} - \frac{6}{7}$.

60. $\left\{ \begin{array}{l} 2\frac{1}{2} + 3\frac{2}{3} \text{ of } \frac{4}{1\frac{1}{3} - \frac{1}{4}} - \frac{3\frac{1}{2}}{4\frac{1}{3}} \\ (2\frac{1}{2} + 3\frac{2}{3}) \text{ of } \frac{4}{1\frac{1}{3} - \frac{1}{4}} - \frac{3\frac{1}{2}}{4\frac{1}{3}} \\ 2\frac{1}{2} + 3\frac{2}{3} \text{ of } \left(\frac{4}{1\frac{1}{3} - \frac{1}{4}} - \frac{3\frac{1}{2}}{4\frac{1}{3}} \right) \end{array} \right.$

61. $\left\{ \begin{array}{l} \frac{1\frac{1}{2}}{2\frac{1}{3}} + 2\frac{1}{3} \text{ of } 1\frac{1}{8} - 4\frac{3}{4} + 2\frac{1}{3}; \\ \frac{1\frac{1}{2}}{2\frac{1}{3}} + 2\frac{1}{3} \text{ of } (1\frac{1}{8} - 4\frac{3}{4}) + 2\frac{1}{3}; \\ \left(\frac{1\frac{1}{2}}{2\frac{1}{3}} + 2\frac{1}{3} \right) \text{ of } (1\frac{1}{8} - 4\frac{3}{4}) + 2\frac{1}{3}; \\ \left(\frac{1\frac{1}{2}}{2\frac{1}{3}} + 2\frac{1}{3} \right) \text{ of } 1\frac{1}{8} - (4\frac{3}{4} + 2\frac{1}{3}). \end{array} \right.$

62. $7\frac{7}{10}$ of $(6\frac{2}{3} - 4\frac{19}{10}) \div (1\frac{7}{10} - 4\frac{5}{22}$ of $3\frac{1}{11}) + \frac{1\frac{2}{3}}{1\frac{1}{8}}$ of $\frac{\frac{1}{2}}{2\frac{1}{2}}$

63. $\frac{\frac{4}{5} \times \frac{8}{9} + \frac{8}{9}(\frac{1}{4} \div \frac{4}{5}) - \frac{1}{6} \text{ of } \frac{2}{3} \text{ of } 4\frac{1}{2} + \frac{2}{3} \text{ of } \frac{21\frac{1}{3}}{16}}{1\frac{7}{10} - 1\frac{5}{8} + 1\frac{1}{5} - 1\frac{3}{4} + 1\frac{1}{2}}$

VALUATION OF CONCRETE FRACTIONS.

Ex. XXIV.

Find the value of:

1. $2\frac{3}{8}$ of £140 3s. $6\frac{1}{2}d$.
2. $3\frac{2}{3}\frac{2}{3}$ of £128 9s. $10\frac{1}{2}d$.
3. $\frac{2}{5}$ of $2\frac{1}{2}$ of $3\frac{1}{3}$ of $\frac{1}{20}$ of 3 cwt. 3 qrs.
4. $\frac{8}{15}$ of $1\frac{1}{3}$ of £140 17s. $6\frac{3}{4}d$.
5. $\frac{10}{11}$ of $12\frac{5}{6}$ of £272 18s. $9\frac{1}{2}d$.
6. $2\frac{1}{3}$ of $\frac{8}{7}$ of £2347 19s. $7\frac{1}{2}d$.
7. $\frac{8}{27}$ of 2 tons 6 cwt. 0 qrs. 18 lbs.
8. $8\frac{4}{7}$ of $\frac{1}{4}\frac{1}{5}$ of 14 lbs. 8 oz. 18 dwts. 17 grs.

9. $\frac{2\frac{1}{3} \div 1\frac{3}{4}}{3}$ of 13s. 4d.
 $2\frac{1}{3} - 1\frac{3}{4}$
 $\frac{3\frac{1}{7} - 2\frac{1}{3} + \frac{3}{4} - \frac{1}{4} \text{ of } \frac{2}{7}}{4\frac{2}{3}}$ of £2 12s.
11. £2040 18s. 5d. $\div 4\frac{1}{4}$.
12. £678 9s. 11 $\frac{1}{4}$ d. $\div 214\frac{1}{3}$.
13. £89491 10s. 7 $\frac{1}{2}$ d. $\div 416\frac{1}{2}$.
14. £99 17s. 0 $\frac{1}{2}$ d. $\div 19\frac{3}{4}$.
15. $\frac{5}{8}$ of £1 + $\frac{9}{4}$ of 1s. + $\frac{2}{3}$ of 1d.
16. $\frac{1}{6}$ of £100 + £1000 $\frac{2}{3}$ + $\frac{3}{5}$ of $\frac{3}{4}$ of £7 $\frac{1}{2}$ + $\frac{2}{3}$ of $\frac{5}{6}$ s.
17. $\frac{3}{5}$ of $2\frac{1}{2}$ of $4\frac{1}{6}$ of 3 miles 4 furs. 5 po. - $\frac{1}{4}$ of $3\frac{1}{2}$ of $\frac{3\frac{1}{2}}{2\frac{1}{3}}$ of 1 mile
2 furs. 19 po.
18. $\frac{3}{5}$ of 4s. 7d. - $\frac{1}{4}\frac{2}{3}$ of 5s. + $\frac{7}{20}$ of 1s. 5 $\frac{1}{2}$ d.
19. $\frac{1}{5}$ of $\frac{3}{10}$ of £1 - $\frac{7}{6}$ of 4 $\frac{1}{2}$ d. + $\frac{8}{15}$ of 2s. 6d.
20. $\frac{3}{5}$ of an acre + $\frac{5}{8}$ of a rood - $\frac{4}{11}$ of a perch.
21. $\frac{3}{4}$ of £1 5s. - $\frac{1\frac{1}{2}}{6\frac{1}{2}}$ of a guinea + $\frac{2}{3}$ of 3s. 6d.
22. $\frac{3}{5}$ of $1\frac{1}{2}$ of $\frac{\frac{2}{3}}{1\frac{2}{5}}$ of an acre - $2\frac{1}{2}$ of 3 yds. + $\frac{3}{5}$ of 2 roods.
23. $\frac{\frac{1}{2} \text{ of } \frac{2}{3} - \frac{2}{3}}{\frac{1}{2} \text{ of } \frac{2}{3} \text{ of } \frac{2}{3}}$ of 2 acres - $2\frac{3}{4}$ of a rood + $\frac{5}{11}$ of 6 yds.
24. Compare the values of $\frac{1}{15}$ of £1, $\frac{1}{20}$ of a guinea, and $\frac{8}{5}$ of a crown.

TO EXPRESS ONE QUANTITY IN TERMS OF ANOTHER.

Ex. XXV.

- Express £1 2s. 4 $\frac{1}{2}$ d. as a fraction of £1 17s. 3 $\frac{1}{2}$ d.
- Express £227 12s. 1d. as a fraction of £273 2s. 6d.
- Express 7 ft. 5 $\frac{3}{4}$ in. as a fraction of a furlong.
- What fractions of £1 are $\frac{1}{5}$ of a penny and $\frac{2}{3}$ of a farthing?
- Reduce $\frac{1}{5}$ of 3s. 4d. to the fraction of 2s. 6d.
- Express $\frac{2}{3}$ of $\frac{1}{3}$ of 1 cwt. 2 qrs. 3 lbs. as a fraction of 5 tons.
- Express $\frac{3}{5}$ of $\frac{5}{6}$ of £1 8s. 7d. as a fraction of £1 4s. 10d.
- Express $\frac{2}{3}$ of 4 cwt. 2 qrs. as a fraction of $\frac{9}{10}$ of 3 cwt. 1 qr. 14 lbs.
- What fraction of $\frac{1}{4}$ of 3 $\frac{1}{2}$ of 16s. 8d. is $\frac{3}{4}$ of $\frac{5}{6}$ of 17s. 6d.?

10. Express $\frac{1}{17}$ of $3\frac{5}{8}$ of $1\frac{7}{16}$ of 18s. in terms of $\frac{1}{2}$ of $7\frac{1}{2}$ of £2 14s. 7d.
11. What part of $\frac{2}{3}$ of $\frac{7}{8}$ of 2 cwt. 3 qrs. 7 lbs. is $2\frac{3}{16}$ of 1 qr. 14 lbs.?
12. What part of $\frac{11}{16}$ of $\frac{2}{3}\frac{5}{8}$ of 13s. 9d. is $\frac{5}{6}$ of $\frac{2}{3}$ of 13s. 4d.?
13. Reduce $\frac{3\frac{1}{2}}{4\frac{1}{3}}$ of 16 lbs. 14 oz. to the fraction of $\frac{4\frac{1}{2}}{3\frac{1}{4}}$ of $\frac{1}{4}$ cwt.
14. Reduce $2\frac{1}{3}$ of 6 cwt. to the fraction of $\frac{1}{2}$ of $2\frac{3}{4}$ of $\frac{\frac{1}{3} - \frac{1}{4}}{\frac{1}{3} + \frac{1}{4}}$ of $5\frac{1}{2}$ tons.
15. Express $1\frac{1}{2}$ of $\frac{1}{\frac{1}{2} + \frac{1}{3}}$ of 2 tons in terms of $7\frac{1}{6}$ of $\frac{\frac{1}{2} - \frac{1}{3}}{\frac{1}{2} + 3}$ of $\frac{3}{2}$ of $20\frac{1}{2}$ tons.
16. What fraction of $3\frac{1}{2}$ lbs. Avoirdupois is $\frac{2\frac{1}{2}}{3}$ of $2\frac{1}{2}$ lbs. Troy?
17. Reduce $\frac{2}{3}$ of £1 4s. — $\frac{3}{4}$ of 17s. 6d. + $3\frac{3}{4}$ of $8\frac{1}{4}$ of 10d. to the fraction of £1 14s. 6d.
18. Express $\frac{3\frac{1}{2}}{1\frac{1}{1}}$ of $\{1\frac{1}{20}\}$ of £1 — $\frac{1}{4}$ of 1s.} as a fraction of a moidore.
19. Express $(\frac{1}{2} + \frac{1}{3})$ of $\frac{2}{3}$ of 21s. as a fraction of $2\frac{1}{2}$ of $\frac{1\frac{1}{3}}{3\frac{1}{4}}$ of 27s.

MISCELLANEOUS EXAMPLES IN FRACTIONS.

Ex. XXVI.

1. What fraction added to the sum of $\frac{5}{7}$, $\frac{2}{3}$, and $2\frac{1}{2}$ will make the result equal to 5?
2. Find what fraction multiplied by the sum of $2\frac{3}{7}$, $1\frac{1}{15}$, and $\frac{4}{15}$ will make the product 17.
3. What fraction divided by $1\frac{2}{3}$ will produce $22\frac{5}{11}$?
4. Required the greatest and the least of the fractions $\frac{3}{4}$, $\frac{2}{3}$, $\frac{1}{2}$, $\frac{4}{5}$, and $\frac{7}{12}$.
5. Find what fraction added to the sum of $\frac{3}{4}$, $1\frac{7}{8}$, and $2\frac{5}{6}$, will make the result a whole number.
6. Reduce $\frac{\frac{3}{4} \text{ of a crown} + \frac{2}{3} \text{ of a shilling}}{4s. 11d.}$ to its simplest form.
7. There is a fraction which, multiplied by $\frac{2}{3}$ of $\frac{4}{5}$ of $1\frac{1}{2}$, will produce 1; find its square.
8. Of what sum is 4 shillings and 3 pence and $1\frac{1}{4}$ farthing, three-sevenths?
9. If the excess of $\frac{9}{13}$ above the remainder be £60, what is the whole sum?

10. Multiply the sum of $\frac{2}{3}$ and $\frac{4}{5}$ by their difference, and divide the product by $8\frac{3}{4}$.
11. Multiply the sum of $\frac{1}{2}$, $1\frac{1}{2}$ and $\frac{5}{6}$ by the difference of $\frac{4}{15}$ and $\frac{3}{20}$, and divide the product by $1\frac{1}{8}$ of $1\frac{1}{16}$.
12. Find the sum of the greatest and least of the fractions $\frac{3}{8}$, $1\frac{5}{12}$, $\frac{5}{6}$, and $\frac{3}{20}$; the sum of the other two; and the difference of those sums.
13. What fraction is that from which if there be taken $\frac{2}{3}$ of $1\frac{7}{18}$ of $\frac{3}{7}$, and to the remainder there be added $\frac{2}{7}$ of $\frac{9\frac{3}{4}}{2}$, the sum will be 13?
14. Reduce $\frac{\frac{3}{16} \text{ of a guinea} - \frac{2}{15} \text{ of a £}}{8s. 10\frac{1}{4}d.}$ to its simplest form.
15. Take $\frac{5}{6}$ from the sum of $51\frac{1}{2}$ and $38\frac{5}{6}$, and divide the remainder by the difference of 11 and $2\frac{2}{3}$.
16. Out of a purse containing £11 7s. 3d., $\frac{2}{7}$ of its contents were taken; find the value of $\frac{2}{3}$ of $1\frac{7}{15}$ of $\frac{21\frac{1}{3}}{15}$ of the remainder.
17. A post has $\frac{1}{3}$ of its length in the mud, $\frac{1}{4}$ in the water, and 12 ft. 6 in. above the water; what is the length of the post?
18. Certain articles are sold singly at £13 17s. $2\frac{1}{4}d.$ each; but if more than a dozen are purchased by one person the charge to him is diminished by £1 19s. $11\frac{1}{2}d.$ each; what is the cost of $39\frac{1}{2}$ of these articles on these terms?
19. If a person's salary be £100 a year, payable quarterly, find the difference between his daily earnings in the two quarters, beginning respectively on the 24th of June and the 29th of September.
20. 5760 lbs. Avoirdupois being equivalent to 7000 lbs. Troy, find the number of drams Avoirdupois in a pound Troy.
21. Reduce 2375 $\frac{1}{4}$ Spanish dollars to English money, the exchange being at 3s. 4d. per dollar. And find the value of 100,000 rupees, at 2s. $3\frac{1}{2}d.$ each.
22. Reduce $\frac{\frac{3\frac{1}{2}}{24} \text{ of } \frac{8}{15} \text{ of £5} - \frac{2}{3} \text{ of a guinea}}{\text{£43 8s. } 2\frac{8}{15}d.}$ to a simple fraction.
23. Reduce $1\frac{1}{2}$ of $1\frac{1}{4}$ of 115 dollars each 4s. $3\frac{1}{4}d.$ to the fraction of $1\frac{1}{4}$ of $2\frac{1}{2}$ of 207 crown pieces; and express this part of 16 coins each 73s. 9d. in guineas and the fraction of a guinea.
24. Out of £4 7s. 6d., one-third is paid to A, and one-seventh to B; after this, four-elevenths of the remainder are paid to A, and the rest to B; find the sums respectively received by A and B.

25. The mint formerly made $44\frac{1}{2}$ guineas out of 1 lb. Troy of gold alloy; if $46\frac{3}{10}$ sovereigns are now made out of the same quantity of gold alloy, is there a gain or a loss by the change?

26. Supposing the time to be between ten and eleven, and that the hour and minute hands are exactly at right angles to each other, what is the correct time?

27. Sound travels through the air at the rate of 1142 feet per second; I observe a flash of lightning, and after 6 strokes of my pulse hear the thunder; if my pulse makes 68 strokes in a minute, how far off is the thunder?

28. The driving wheel of a locomotive engine was $21\frac{1}{4}$ feet in circumference, and turned 90 times in a minute; now if, on a certain day, this wheel slipped $\frac{1}{3}$ th part of its circumference each turn, at what rate per hour did the engine move?

29. After using $\frac{2}{3}$ of a Lent cheese, $\frac{2}{3}$ of the remainder sold for 13s. $5\frac{1}{2}$ d.; what was the worth of the whole cheese?

30. A gentleman throws a number of coins, which consist of sovereigns, shillings, and pence, amongst three boys, *A*, *B*, and *C*. In the scramble

$$\begin{array}{ll} A \text{ gathers } \frac{1}{2} \text{ the gold, } \frac{1}{4} \text{ the silver, and } \frac{1}{8} \text{ the pence;} \\ B \dots \frac{1}{8} \dots \frac{1}{2} \dots \text{ and } \frac{1}{4} \dots \\ C \dots \frac{1}{4} \dots \frac{1}{8} \dots \text{ and } \frac{1}{2} \dots \end{array}$$

find how much each gathers, and the whole sum, supposing one sovereign, one shilling, and one penny to remain unobserved.

31. In a match of cricket, a side of eleven men gained a certain number of runs; one player obtained $\frac{1}{8}$ of the number; each of two others $\frac{1}{10}$; each of three others $\frac{1}{20}$; and the rest made up between them 63 runs; what was the whole number of runs? and what was the score of each man, supposing that 4 of the last 5 players scored 5 times as much as the other?

32. A working man found some ancient coins; but as he carried them home he lost $\frac{1}{4}$ of them, had his pocket picked of $\frac{2}{3}$ of the remainder, and paid a debt with $\frac{2}{3}$ of what he had left; after which he found that he had only 10 remaining: how many did he find?

33. A person dies worth £10,000, and leaves $\frac{1}{3}$ of his property to his wife, $\frac{1}{2}$ to his son, and the rest to his daughter. The wife at her death leaves $\frac{2}{3}$ of her legacy to the son, and the rest to the daughter; but the son adds his fortune to his sister's, and gives her $\frac{1}{3}$ of the whole. How

much will the sister gain by this ? and what fraction will her gain be of the whole ?

34. Write in descending order of magnitude the following fractions : $\frac{3}{2}$, $\frac{7}{5}$, $\frac{17}{10}$, $\frac{13}{8}$, $\frac{5}{3}$, $\frac{19}{12}$, $\frac{11}{6}$, and $\frac{36958}{88988}$.

35. Of the sovereigns who have reigned in England since the Norman Conquest, there are $\frac{1}{6}$ th of one name, $\frac{2}{3}$ ths of another, $\frac{1}{12}$ th of another, $\frac{1}{3}$ th of each of two others, and $\frac{1}{18}$ th of each of three others, and there are 5 besides ; hence determine how many sovereigns have reigned in England since the Conquest.

36. Is $\frac{4}{21}$ more nearly equal to $\frac{1}{6}$ or to $3\frac{1}{2} - 2\frac{2}{21} + \frac{1\frac{1}{4}}{3\frac{1}{2}}$ of $2\frac{1}{3} - 1\frac{1}{7}$, and by how much ?

37. A man pays away $\frac{1}{4}$ th of his money, then $\frac{1}{3}$ rd of what remains, and then $\frac{2}{3}$ ths of the second remainder, after which he has 7s. 6d. remaining ; how much had he at first ?

38. A ship and cargo are together worth £10892 9s. 6d. ; the ship is worth $\frac{2}{3} + \frac{1}{15}$ of $\frac{7}{16} - \frac{7}{80}$ of the whole ; find the value of $\frac{4}{11}$ of the cargo.

39. When $\frac{1}{6}$ of $\frac{3}{16} + \frac{1}{6}$ of $\frac{47}{65}$ of its contents were taken out of a purse, there remained £3 12s. 9 $\frac{3}{4}$ d. ; how much did the purse contain at first ?

40. Allowing that $44\frac{1}{2}$ guineas weigh a pound Troy, and 32 halfpence weigh a pound Avoirdupois, what is the difference in grains between the weights of a guinea and a halfpenny ?

41. A met two beggars B and C ; and having with him $\frac{3\frac{7}{11}}{4\frac{7}{9}}$ of $\frac{10\frac{5}{7}}{7\frac{1}{2}}$ of $\frac{77}{540}$ of a moidore, gave B $\frac{1}{4}$ of $\frac{3}{4}$ of that sum, and C $\frac{2}{3}$ of the remainder ; what did each receive ?

42. A man pays a corn-rent of 5 quarters of wheat and 3 of barley, Winchester measure ; what is the value of his rent, wheat being at 60s. and barley at 54s. per quarter, Imperial measure, supposing an Imperial gallon to be equal to $\frac{33}{32}$ of a Winchester gallon ?

43. Sound travels at such a rate that the report of a gun known to be $4\frac{1}{2}$ miles distant is heard $20\frac{60}{571}$ seconds after the flash is seen, and the velocity of light is $887705\frac{44}{11}$ times that of sound ; how far does light travel in a second ? Also how far off is that star from which light takes $1205\frac{295}{324}$ days to reach the earth ?

DECIMAL FRACTIONS.

Ex. XXVII.—ADDITION.

1. $303\cdot303 + 172\cdot172 + \cdot0606 + 23 + 27\cdot4274.$
2. $\cdot005 + \cdot0027 + 21\cdot005 + 30\cdot0486 + 74\cdot0637.$
3. $3456\cdot709 + 345\cdot6709 + 34\cdot56709 + 3\cdot456709.$
4. $3\cdot4267 + 426\cdot3 + 1273 + 5\cdot2833 + 27\cdot51843.$
5. $\cdot0985 + 3\cdot456 + 2\cdot02 + 119 + \cdot000296 + 4\cdot5210007.$
6. $3\cdot1246 + 125 + \cdot0003 + 2\cdot237 + 406\cdot5 + 7\cdot2084.$
7. $74\cdot0367 + \cdot0000526 + 8 + 3\cdot973 + 47\cdot5 + \cdot2854.$
8. $1\cdot25 + 2347 + \cdot067 + 23\cdot8 + \cdot4760009 + 2\cdot86321.$
9. $\cdot0042165 + \cdot937 + 4000 + \cdot000625 + 1\cdot2013 + \cdot001.$
10. $\cdot024 + \cdot75 + 43 + \cdot000417 + 2\cdot0168 + \cdot913.$
11. $\cdot99987 + 42\cdot898792 + \cdot9847 + \cdot987\cdot099 + \cdot9989.$
12. $2\cdot007 + \cdot048001 + \cdot01 + 567\cdot2 + \cdot90400657 + 17\cdot84651.$

Ex. XXVIII.—SUBTRACTION.

- | | |
|---|---------------------------------------|
| 1. $\cdot1 - \cdot01.$ | 6. $17\cdot30185 - \cdot851476.$ |
| 2. $1\cdot03 - \cdot1073.$ | 7. $269\cdot34 - 17\cdot98765.$ |
| 3. $1 - \cdot00001.$ | 8. $63\cdot5 - 2\cdot0000427.$ |
| 4. $30\cdot7265 - \cdot007598.$ | 9. $29\cdot085763218 - 7\cdot045.$ |
| 5. $912 - \cdot71836.$ | 10. $9\cdot015 - 5\cdot108700684938.$ |
| 11. $3\cdot468 + 6\cdot13 - \cdot00416.$ | |
| 12. $63\cdot5507 - 26\cdot413 + \cdot0463.$ | |
| 13. $45\cdot007 - 2\cdot6189 - 11\cdot99986.$ | |
| 14. $27\cdot614586 + 1\cdot0008 - 17\cdot081540965.$ | |
| 15. $2\cdot36809 - 17\cdot265008 + 22\cdot5.$ | |
| 16. $108\cdot62 + 3\cdot801 - \cdot1007 - 17\cdot365.$ | |
| 17. $327\cdot1006 - 18\cdot715 - 92\cdot00004 - \cdot100063.$ | |
| 18. $101\cdot010101 - 22\cdot0202 + 675\cdot675 + 18\cdot18.$ | |
| 19. $45\cdot632 + \cdot007814 - 19\cdot650008 + 81\cdot1.$ | |
| 20. $17\cdot284 - 5\cdot000601 + 2\cdot354 - 10\cdot000009.$ | |

Ex. XXIX.—MULTIPLICATION.

- | | |
|------------------------------------|-------------------------------------|
| 1. $1\cdot525 \times 80\cdot08.$ | 4. $\cdot007853 \times \cdot00476.$ |
| 2. $192\cdot8 \times \cdot01928.$ | 5. $\cdot03162 \times \cdot00146.$ |
| 3. $\cdot2365 \times \cdot002435.$ | 6. $17\cdot514 \times 6\cdot593.$ |

7. 4·59234	\times	1·003.	14. ·002576	\times	·038.
8. ·78539	\times	·076.	15. ·1 \times ·1 \times ·1 \times ·1 \times ·1.		
9. 32·007	\times	7·06.	16. ·1 \times ·2 \times ·3 \times ·4 \times ·5 \times ·6.		
10. 7·2416	\times	6·214.	17. ·012 \times ·035 \times 50·1.		
11. ·0010102	\times	109·01.	18. 3·417 \times ·0249 \times ·0007.		
12. 21·32	\times	·100406.	19. ·007853	\times	·00476 \times 300.
13. 13·0426	\times	8·3924.	20. 72·0376	\times	3·5981 \times ·02.

Ex. XXX.—DIVISION.

1. 7·53	\div	2·5.	21. 48	\div	·002.
2. 144	\div	·192.	22. 250	\div	·000035.
3. ·0022675	\div	·907.	23. 87·9288	\div	7·3.
4. 4·63638	\div	81·34.	24. 7·6394	\div	2·2.
5. 15·4546	\div	·019.	25. ·000035	\div	250.
6. ·429408	\div	59·64.	26. ·04	\div	·0082.
7. ·034	\div	2·14.	27. 3·07930896	\div	·0378.
8. 50·08747	\div	270·56.	28. ·0125	\div	7·4.
9. 3·717184	\div	·000048.	29. ·16	\div	·0042.
10. 122·122	\div	·000625.	30. 670	\div	·0015.
11. 21·58821	\div	·000246.	31. 34·17	\div	3·25.
12. 12·34	\div	·027.	32. 2147·04	\div	·036.
13. 12·34	\div	27.	33. 377·978	\div	·0017.
14. 12·34	\div	·000027.	34. 4·63638	\div	81·34.
15. 7·72	\div	·297.	35. 17·084592	\div	·024.
16. 4·8	\div	·00016.	36. ·00071012	\div	1·732.
17. ·0281849	\div	·00081849.	37. ·94373	\div	·92841.
18. 2·763	\div	·9.	38. ·234567	\div	·123456.
19. 1·577063	\div	·673.	39. ·31742	\div	·28398.
20. 72	\div	1·000005.	40. 1138·47	\div	125000.

41. 24·01 \times ·0039 \div 133·77.
 42. ·049 \times 3·417 \div ·0007.
 43. ·0001416 \times ·0012167 \div ·0000000125.
 44. ·000785 \div ·0005 — ·000075 \div 15.
 45. (3·124 + 1·25) \times (2·237 — ·026) \div ·0003.
 46. (4·32 + 3·179) \times (4·32 — 3·179) \div ·009.

REDUCTION OF VULGAR FRACTIONS TO DECIMALS.

Ex. XXXI.

Reduce to Decimals :

1. $\frac{7}{120}$.	5. $\frac{167}{40}$.	9. $\frac{1843}{184}$.
2. $\frac{5}{16}$.	6. $\frac{6\frac{3}{5}}{120}$.	10. $\frac{875}{432}$.
3. $11\frac{10}{125}$.	7. $3\frac{177}{1250}$.	11. $\frac{882}{3741}$.
4. $9\frac{19}{2500}$.	8. $\frac{7}{1280}$.	12. $\frac{964}{31}$.
13. $\frac{4}{15}$.	17. $\frac{21}{4}$.	22. $\frac{50}{3}$.
14. $8\frac{5}{27}$.	18. $6\frac{5}{2}$.	23. $1\frac{1111}{3300}$.
15. $17\frac{1}{100}$.	19. $2\frac{4}{5}\frac{23}{50}$.	24. $\frac{11}{67\frac{1}{2}}$.
16. $14\frac{5}{14}$.	20. $6\frac{3}{3}\frac{101}{100}$.	21. $20\frac{2273}{11250}$.
25. $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \frac{1}{32}$.		
26. $\frac{1}{3} + \frac{1}{6} + \frac{1}{14} + \frac{1}{56}$.		
27. $\frac{247}{5} + \frac{1512}{108} + \frac{17}{75} + 200\frac{7}{10} + \frac{11}{625}$.		
28. $2 + \frac{1}{1.2} + \frac{1}{1.2.3} + \frac{1}{1.2.3.4} + \dots$		
29. $16\left\{\frac{1}{5} - \frac{1}{3.5^3} + \frac{1}{5.5^5} - \frac{1}{7.5^7}\right\} - \frac{4}{239}$		
30. $\frac{1}{2} + \frac{1}{3.2^3} + \frac{1}{5.2^5} + \frac{1}{7.2^7} + \dots$		

REDUCTION OF DECIMALS TO VULGAR FRACTIONS.

Ex. XXXII.

Reduce to Vulgar Fractions :

1. 13125.	5. 12.96875.	9. 2738128.
2. .00234375.	6. 2.301125.	10. 27.0028125.
3. .00390625.	7. 17.0008275.	11. 14.0000625.
4. .0019140625.	8. 5.007352.	12. 3.0007875.

13. 3.	21. 6 285714.	29. 27·027.
14. 13.	22. 17·12345.	30. 1·428571.
15. 29.	23. 9·0013.	31. 3·42753.
16. 4·083.	24. 25·4237.	32. 2·00637.
17. 126.	25. 14·526.	33. 3769230.
18. 573.	26. 3·00457.	34. 4·007432.
19. 9126.	27. 2·0000363005.	35. 64·007821.
20. 3·27013.	28. 7·00076923.	36. 45 07121.

ADDITION OF RECURRING DECIMALS.

Ex. XXXIII.

1. 186947 + 2304 + 191·71 + .67 + 14·7936 + 892.
2. 0769 + 14.003 + 6·72 + .482 + 108·5631 + 2·9.
3. 23478 + 19·863 + 200·0006 + 2·3 + 746·3897 + 1·92345.
4. 1·2378 + 6·19 + 192·3256 + .61 + 834 + .0002.
5. 16·003 + 7·209 + 104·4721 + 100·3769842.
6. 3456·709 + 345·6709 + 34·56709 + 3·456709.
7. 3·4267 + 426·3 + .0075 + 5·2833 + 27·51843.
8. 63·5507 + 0463 + 1·413 + .006 + 950·7065.
9. 2·130257 + 21·30257 + 213·0257 + 2130·257.
10. 138 + 146793 + 276 + 24·1372 + .0054 + 5·2178.
11. 008497133 + 44·85 + 3·026 + 1075 + .5432 + 2·4173.
12. 275068 + 3074·254 + 1·25873 + 60·4 + 1·2340.

SUBTRACTION OF RECURRING DECIMALS.

Ex. XXXIV.

- | | |
|---------------------------------|---------------------------------|
| 1. 13·127 - 7·0073861. | 7. 7·462 - 7·462. |
| 2. 108·5631 - .482. | 8. 1942 - 08·76531. |
| 3. 87·75234891 - 19·832184. | 9. 3·0045 - 1·1000462751. |
| 4. 201·214221676 - 100·3749863. | 10. 8·2478 - 1·00562. |
| 5. 1101·680021 - 100·6801. | 11. 7·3214 - 1·207. |
| 6. 176·4588632 - 14·373. | 12. 13·378872397 - 4·008632157. |

13. $3\dot{4}6\dot{8} + 6\dot{1}\dot{3} - 9\dot{5}9\dot{7}8560\dot{3}$.
14. $63\dot{5}50\dot{7} - 37\dot{1}83\dot{7}2800\dot{0} + \dot{0}4\dot{6}3\dot{}$.
15. $\dot{7}12\dot{5} + \dot{6}75\dot{7} - 6\dot{6}646473\dot{7}$.
16. $32\dot{1}665863\dot{1} - 9\dot{0}0\dot{0}\dot{6} - 18\dot{0}42857\dot{1}$.
17. $44\dot{6}356238\dot{0} - 1\dot{0}0\dot{2} - 15\dot{9}1\dot{3} - 17\dot{1}1\dot{6}$.
18. $99\dot{7}01\dot{2} + 19\dot{4}0\dot{3} - 63\dot{8}49\dot{2}13\dot{7} + 6\dot{2}186\dot{5}$.

MULTIPLICATION OF RECURRING DECIMALS.

Ex. XXXV.

- | | |
|---|---|
| 1. $2\dot{3}64\dot{8} \times 2\dot{1}4$. | 7. $16\dot{2}007\dot{5} \times 8\dot{9}14$. |
| 2. $6\dot{7}073\dot{1} \times 2\dot{3}4$. | 8. $1\dot{0}001 \times \dot{0}9081$. |
| 3. $5\dot{2}184\dot{6} \times 18\dot{5}$. | 9. $2\dot{8}96430\dot{2} \times 80\dot{2}13$. |
| 4. $8\dot{0}4761\dot{9} \times 3\dot{2}9$. | 10. $1\dot{1}23456\dot{7} \times 6\dot{0}471$. |
| 5. $7\dot{2}5\dot{9} \times 1\dot{2}3$. | 11. $8\dot{0}0728\dot{3} \times 2\dot{1}7005$. |
| 6. $6\dot{3}91782\dot{5} \times 6\dot{9}24$. | 12. $4\dot{6}150\dot{4} \times 31\dot{0}0005$. |
|
 |
 |
| 13. $\dot{1} \times \dot{0}0\dot{9}$. | 19. $\dot{2}\dot{1} \times \dot{1}\dot{7}1428\dot{5}$. |
| 14. $5\dot{8}\dot{1} \times \dot{4}58\dot{3}$. | 20. $\dot{6}\dot{7}2 \times \dot{0}1\dot{1}89$. |
| 15. $\dot{2}\dot{9} \times \dot{0}1\dot{3}$. | 21. $\dot{1}283\dot{7} \times 2\dot{5}22\dot{7}$. |
| 16. $49\dot{3} \times \dot{2}995\dot{4}$. | 22. $\dot{4}4\dot{1} \times \dot{6}785714\dot{2}$. |
| 17. $\dot{2}\dot{6} \times \dot{7}08\dot{3}$. | 23. $\dot{3}\dot{7}6923\dot{0} \times \dot{0}35\dot{4}$. |
| 18. $3\dot{1}\dot{4} \times 2\dot{0}063\dot{7}$. | 24. $\dot{7}053\dot{6}7142\dot{8} \times 6\dot{1}582278481012\dot{6}$. |

DIVISION OF RECURRING DECIMALS.

Ex. XXXVI.

- | | |
|--|---|
| 1. $\dot{3}\dot{8} \div \dot{3}$. | 7. $\dot{1}7948\dot{7} \div \dot{5}3846\dot{1}$. |
| 2. $\dot{2}\dot{7} \div \dot{3}\dot{1}\dot{8}$. | 8. $\dot{0}269230\dot{7} \div \dot{1}5384\dot{6}$. |
| 3. $1\dot{9} \div \dot{1}4285\dot{7}$. | 9. $\dot{0}1831\dot{5} \div \dot{0}0447\dot{7}$. |
| 4. $\dot{0}0\dot{0}\dot{7} \div \dot{0}2\dot{1}$. | 10. $2\dot{1}659\dot{5} \div \dot{0}4$. |
| 5. $2\dot{2}9\dot{7} \div 7\dot{7}\dot{2}$. | 11. $411\dot{3}51\dot{9} \div 58\dot{7}64\dot{5}$. |
| 6. $77\dot{6}724\dot{0} \div 9\dot{4}\dot{2}\dot{6}$. | 12. $\dot{2}8571\dot{4} \div \dot{3}0769\dot{2}$. |

13. $3\dot{4}267 \times 0\dot{1}3 + 1\dot{4}2857.$
14. $0\dot{2} \times 6\dot{0}0207 - 2\dot{4}381\dot{2} \div 33\cdot 4.$
15. $(7\dot{4}62 - 11\cdot 7\dot{1}\dot{4} + 6\cdot 31\dot{4}) \div (7\cdot 563 - 7\cdot 563).$

VALUATION OF CONCRETE DECIMALS.

Ex. XXXVII.

Find the value of

1. $\cdot 8125$ of £1; and $\cdot 2135$ of £7 16s. 10d.
2. $4\cdot 6875$ of a cwt., and $\cdot 1080078125$ of a ton.
3. $1\cdot 7962$ of £7, and also of £6 13s. 4d.
4. $3\cdot 97216$ of £20, and also of £11 9s. 6d.
5. $12\cdot 3475$ of 1 ton, and also of 1 ton. 2 cwt. 3 qrs.
6. $9\cdot 1257$ of 4 miles, and also of 3 miles 0 fur. 21 po. $4\frac{1}{2}$ yds.
7. $18\cdot 6392$ of 9 oz. Troy, and also of 1 lb. 4 oz. 15 dwts.
8. $\cdot 70323$ of £1 — $3\cdot 5646$ of 1s.
9. $22\cdot 4735$ of £1 — $17\cdot 2845$ of a guinea.
10. $\cdot 45$ of £5 10s. — $0\cdot 0125$ of £4 13s. 4d. + $0\cdot 0375$ of £3.
11. $12\cdot 789$ of a ton. + $2\cdot 98$ of a cwt. — $13\cdot 005$ of a lb.
12. $\cdot 0057$ of £1 + $9\cdot 245$ of 5s. 6d. — $1\cdot 26$ of 2s. 3d.
13. $\cdot 65$ of £3 10s. + $\cdot 3$ of £2 3s. — $2\cdot 063$ of £4 6s. 9d.
14. $\cdot 6$ of a ton + $\cdot 4$ of a cwt. + $\cdot 666$ of a lb.
15. $\cdot 375$ of $2\frac{1}{2}$ cwt. + $\cdot 523$ of 1 cwt. 1 qr. 14 lbs. + $\cdot 75$ of $3\frac{1}{2}$ lbs.
16. $4\cdot 37$ acres + $652\cdot 7$ roods — $239\cdot 87$ half-yards.
17. $2\cdot 123$ of £1, and $\cdot 234$ of £20.
18. $\cdot 440625$ of £1, and $5\cdot 36267$ of a guinea.
19. $29\cdot 530588194$ of a day, and 7882571428 of a week.
20. Convert into pounds, shillings, and pence :
 (1) £105 1 florin 4 cents 5 mils. | (4) £27 3 florins 6 cents 5 mils.
 (2) £6 1 florin 7 cents 5 mils. | (5) £15 3 florins 1 cent $2\frac{1}{2}$ mils.
 (3) £12 6 florins 2 cents 5 mils. | (6) £8 1 florin 0 cent $6\frac{1}{2}$ mils.

TO EXPRESS ONE QUANTITY AS A DECIMAL OF
ANOTHER.

Ex. XXXVIII.

1. Express 12*s.* 6*d.* as a decimal of £1, and also of £2 12*s.* 6*d.*
2. Express 18*s.* 4*d.* as a decimal of £6, and also of £6 6*s.* 6*d.*
3. Express £3 11*s.* 9*d.* as a decimal of £1, and also of £2 10*s.*
4. Express £2 13*s.* 4*d.* as a decimal of £9, and also of £9 9*s.* 9*d.*
5. Express £2 15*s.* 2*d.* as a decimal of £10, and also of £9 16*s.* 8*d.*
6. Reduce 13*s.* 6*d.* to the decimal of a guinea.
7. Reduce £3 6*s.* 8*d.* to the decimal of £7 10*s.*
8. Reduce 7*s.* 8*d.* to the decimal of half-a-guinea.
9. What decimal of a guinea is £5 16*s.* 3*d.*?
10. What decimal of 2*s.* 6*d.* is £2 8*s.* 1·518*d.*?
11. Reduce 2835 of £1 to the decimal of a guinea.
12. What decimal of a year is equivalent to a day?
13. What decimal of £3 16*s.* 10*d.* is equal to £2 17*s.* 6*d.*
14. Reduce 2*3*/*10* inches to the decimal of a mile, and 7 ft. 5*3*/*4* in. to the decimal of a furlong.
15. What decimal of a month will represent 3 weeks 4 days 5 hours 6 minutes 7 seconds?
16. Express 17 cwt. 0 qr. 23 lbs. as a decimal of 1 ton, and also of 2 tons. 1 cwt. 3 qrs.
17. Express 36 miles 2 furlongs 21 poles 4*1*/*2* yards as a decimal of 4 miles, and also of 3 miles 13 poles 1*1*/*2* yard.
18. Express 10 tons 15 cwt. 3 qrs. 14 lbs. as a decimal of 25 tons, and also of 12 tons 16 cwt. 10 lbs.
19. Express 17 lbs. 5 oz. 16 dwts. 20 grs. as a decimal of 100 lbs., and also of 100 lbs. 7 oz. 18 dwts.
20. What decimal of a ton will represent 16 cwt. 3 qrs. 17*2*/*5* lbs?
21. What decimal of £5 is equivalent to $\frac{3}{5}$ of 25*s.*
22. Convert into decimal coinage,

(1) 7 <i>1</i> / <i>2</i> .		(7) £100 14 <i>s.</i> 6 <i>d.</i>
(2) £24 15 <i>s.</i>		(8) £12 3 <i>s.</i> 6 <i>d.</i>
(3) £41 8 <i>s.</i> 9 <i>d.</i>		(9) £19 2 <i>s.</i> 6 <i>d.</i>
(4) £7 9 <i>s.</i> 3 <i>d.</i>		(10) £58 6 <i>s.</i> 1 <i>1</i> / <i>2</i> <i>d.</i>
(5) £3 14 <i>s.</i> 5 <i>1</i> / <i>2</i> <i>d.</i>		(11) £16 5 <i>s.</i> 1 <i>1</i> / <i>5</i> <i>d.</i>
(6) £8 12 <i>s.</i> 3 <i>3</i> / <i>4</i> <i>d.</i>		(12) £11 5 <i>s.</i> 2 <i>4</i> / <i>5</i> <i>d.</i>

MISCELLANEOUS EXAMPLES IN DECIMALS.

Ex. XXXIX.

1. Express in a decimal form :

$$(1) \quad 2 + \frac{4}{5} + \frac{7}{1000} + \frac{16}{20000}$$

$$(2) \quad 17 + \frac{16}{800} + \frac{1}{125} + \frac{18}{200000}$$

$$(3) \quad .0742 + \frac{13}{625} - \frac{9}{400}.$$

2. Multiply seven millionths, seven thousandths, and seventy, by six millionths, three hundredths, and ninety ; and divide the product by two millionths, one hundredth and thirty.

3. Multiply eight thousand, two tenths, and eight hundred-thousandths by five hundred, three tenths, and four thousandths ; and divide the product by nine thousand and five + four hundred and seventy-two thousandths.

4. Multiply the sum of 2.016 and .2016 by .02016, and divide the product by .27.

5. Find the quotient of $\frac{49}{21} + \frac{5}{12} - \frac{25}{14} + \frac{45}{48}$ divided by .0036625, to 7 places of decimals.

6. Required the vulgar fraction equivalent to .83 + .63 + .73.

7. What is the value of $\frac{2}{3}$ of .709 of .6 of $\frac{2}{3}$ of $\frac{25}{3}$ of £7 13s. 6 $\frac{1}{2}$ d.?

8. Multiply 3.45 of £5 10s. by 7.5.

9. Reduce $\frac{2}{3}$ of .571428 of 115 dollars, each 4s. 3 $\frac{1}{2}$ d. to the fraction of .8 of $\frac{2}{3}$ of 161 crown pieces.

10. Multiply 21 acres, 3 roods, 17 perches by .02.

11. What is the price of 284.8665 bushels of wheat at 7s. 0 $\frac{1}{2}$ d. per bushel ?

12. Reduce 4156 lbs. 10 oz. 11 dwts. to cwt. Avoirdupois, and a decimal.

13. Divide 1.6 by 2, .2 and .00002, and find the product of the quotients.

14. There are two fractions, viz. $\frac{117}{468}$ and $\frac{113}{418}$; also two others, viz. $\frac{238}{228}$ and $\frac{265}{228}$; find the product of the smaller fraction in each couple, and take this part of .07426 from the product of .125 and 7.162.

15. Write in order of magnitude, beginning with the least, $\frac{17}{42}$, $\frac{1}{2}$, .87, $\frac{2}{5}$, 1, .59, $\frac{3}{10}$.

16. Reduce £ $\frac{.036}{1875}$ to the fraction of a farthing, and divide £36 by .001875 ?
17. Find the value of .9076 of £51 14s. $10\frac{1}{4}d.$ in guineas and the decimal of a guinea ?
18. What is the least multiple of 3.42986, that is a finite decimal ?
19. If £1 = 10 florins = 100 cents = 1000 mils, add together £78 5 fl. 3 c. 7 m.; £64 4 fl. 2 c. 8 m.; and £5 9 fl. 5 c. 6 m.
20. Find the difference between £18 2 fl. 3 c. 9 m. and £6 4 fl. 5 m., expressing the result in pounds, shillings, &c.
21. Multiply £7 6 fl. 3 c. 5 m. by 47.4; and divide £892 2 fl. 3 c. $5\frac{1}{16}$ m. by 48.5.
22. Simplify the following expressions :
- (1) $\frac{3}{7}$ of $\frac{17.48}{2.7} \times \frac{.034}{.0038} + \frac{2\frac{2}{3}}{1\frac{1}{2}}$ of 3.45.
 - (2) $3.25 - \frac{7.25 - 5.5}{4\frac{2}{7} - 2\frac{2}{3}} + .875$ of $\frac{2.75}{6.3}$
 - (3) $\frac{.005}{\frac{2}{3} \text{ of } 13\frac{1}{2}} \text{ of } \frac{26.25}{\frac{3}{4} \text{ of } 2.75}$
 - (4) $\frac{7\frac{1}{2} \times 3\frac{3}{8}}{.75 \times 36.6} + \frac{2\frac{3}{4} \text{ of } 15}{2\frac{1}{3} \text{ of } 3\frac{3}{4}} + \frac{7.25}{11\frac{3}{8}}$
 - (5) $2 + \frac{25}{.625} + \frac{.05}{\frac{1}{20} \text{ of } .05} - \frac{.025}{\frac{1}{2} \text{ of } \frac{9}{10}}$
 - (6) $\frac{2.75 \times .523809}{6.6 \times 1.571428} + \frac{1.27}{.127} - \frac{2.005}{601.5}$
23. Find the difference between $\frac{4\frac{7}{10} + 5.81 - 2.5}{4\frac{7}{10}}$ and $\frac{9}{10}$ of 32 of $.45$, and $\frac{9}{10}$ of $\frac{7}{47}$ of .875.
24. What decimal must 15 be multiplied by, in order that the product may equal $\frac{2}{3}$?
25. Express $\frac{2\frac{2}{3} + 5.27}{2\frac{1}{3} \text{ of } 5\frac{7}{11}}$ of £25 as a fraction of $\frac{3.7 \text{ of } 2.25}{4.4583 + 7.16}$ of £20.
26. The true length of the year is 365.24224 days; find what the error amounts to by the common reckoning in four centuries.
27. What fraction of $\frac{\frac{1}{2} \text{ of } 2\frac{1}{3}}{2.36 + 1.7}$ of £3 10s. is $\frac{4.03 - 3.3}{2\frac{2}{3} \text{ of } 3\frac{3}{4}}$ of £1 ?

28. Given that the circumference of a circle is 3·14159 times its diameter; find in feet and inches the diameter of a cylinder whose circumference is 14 ft. 11 $\frac{1}{2}$ inches.

29. The length of a French metre is 39·371 inches, and it equals the forty-millionth part of the circumference of the earth; find the circumference of the earth in miles.

30. If 66 shillings weigh a pound Troy, find the exact weight of a shilling, reducing the result to the decimal of a dwt.

31. The French metre containing 39·371 English inches, how many English yards are contained in 32 metres ?

32. Goliath is said to have been 6 $\frac{1}{2}$ cubits high; what was his height estimated in feet and inches, considering the cubit equivalent to 19·168 inches ?

33. The length of $\frac{1}{386}$ th of the earth's circumference is 69·045 miles nearly, and the circumference is 3·14159 times the diameter; find the length of the earth's diameter in miles.

34. A quadrant of the meridian in French metres is 10000565·278, and a metre is 39·371 English inches; find the length of the quadrant in English feet.

35. The number of degrees in an arc of a circle which is equal to the radius is 57·29578; required the number of seconds in the same.

36. A sidereal day is 23 hours, 56 minutes, and the mean solar day is 24 hours; reduce the difference between the two to the decimal of a sidereal day.

37. A gallon of pure water weighs 10 lbs. Avoirdupois, and measures 277·274 cubic inches; find the weight of a cubic foot of water, and the number of gallons in half a cubic yard of water.

38. Lead being 11·325 times as heavy as water, find the weight of a cubic foot of lead in lbs. and a decimal. (See preceding question.)

39. If the length of a pendulum vibrating seconds be divided into 12231 equal parts, the yard is equal to 11250 of these parts; find the length of the second's pendulum in inches and decimal parts of an inch.

40. Given that the mean distance of the Sun from the Earth
 $= \frac{3420\cdot9}{8\cdot57} \times$ distance of the Moon from the Earth; also the distance of

the Moon from the Earth = 60·28 \times the radius of the Earth, and the radius of the Earth = 3962·8 miles; hence find the mean distance of the Sun from the Earth in miles.

PRACTICE.

Ex. XL.—CASE I.

Find the value of—

1.	1172 articles at	18s. 10d. each.
2.	34268	7s. 9d. "
3.	3938	5s. 9d. "
4.	805	£3 12s. 7½d. "
5.	14764	£1 17s. 8½d. "
6.	1684	£8 5s. 1½d. "
7.	11228	£7 7s. 2½d. "
8.	12357	£19 19s. 10½d. "
9.	16338	£11 9s. 9½d. "
10.	12548	£37 17s. 11½d. "
11.	102286	£14 13s. 3½d. "
12.	13815	£2 14s. 1½d. "
13.	134·56	£1 7s. 6d. "
14.	442·875	£1 19s. 2½d. "
15.	8216½	£4 0s. 2½d. "
16.	5416¼	10½d. "
17.	1317⁹	£2 13s. 6¾d. "
18.	39⁷¹¹	£1033 7s. 0¾d. "
19.	2763³⁸	13s. 6¾d. "
20.	785²⁴	£1 17s. 6d. "
21.	5287⁷⁵	£3 5s. 7½d. "
22.	5031⁵¹³	£7 12s. 8½d. "
23.	14857³⁸	£2 9s. 10½d. "
24.	24020⁸¹¹	£2 14s. 11½d. "

Ex. XLI.—CASE II.

Find the value of—

- 3 tons 5 cwt. 4 lbs. at £3 17s. per cwt.
- 20 acres 3 roods 25 poles, at £5 7s. 6½d. per acre.
- 7 qrs. 3 bushels 3½ pecks, at 7s. 4d. per bushel.
- 1461 lbs. 3 oz. 5 dwts. at £50 14s. per lb.
- 191 acres 3 roods 37 poles at £42 3s. 4d. per acre.
- 89 cwt. 3 qrs. 6 lbs. at £3 15s. 4d. per cwt.
- 67 cwt. 2 qrs. 8 lbs. at £5 6s. 3d. per cwt.

8. 843 yards 2 ft. 10 in. at £2 11s. 3d. per yard.
9. 4029 qrs. 6 bus. 5 gals. at £3 3s. 4d. per quarter.
10. 45 acres 2 qrs. 27 poles, at £48 12s. 6d. per acre.
11. 17 cwt. 1 qr. 12 lbs. at £1 19s. 8d. per cwt.
12. 356 acres 3 roods 39½ poles, at £2 13s. 4d. per acre.
13. 46 quarters, 5 bus. 2 pks. 1 gal. at £2 18s. 8d. per quarter.
14. 2 lbs. 6 oz. 13 dwts. 10 grs. at £1 9s. 2d. per ounce.
15. 7 cwt. 2 qrs. 17½ lbs. at £3 15s. 4½d. per quarter.
16. 28 yards 2 qrs. 1¾ nails, at £1 11s. 1½d. per yard.
17. 87 E. ells 3 qrs. 2 nails, at £3 10s. 6d. per E. ell.
18. £3428 16s. 3½d. at 12s. 7½d. per pound.
19. 76 lbs. 9 oz. 10 dwts. at 18 dwts. 12 grs. per pound.
20. £1710 14s. 6d. at £1 13s. 4½d. per pound.
21. What is the rent of 38 acres 2 ro. 30 poles, at 2 guineas per acre.
22. What is the value of 42 acres 2 ro. 10 poles, at £100 5s. per acre.
23. Required the price of 15 cwt. 3 qrs. 16 lbs. at £2 17s. per cwt.
24. What is the dividend on £913 18s. 4½d. at 16s. 3d. in the pound.
25. Find the price of 19 qrs. 7 bus. 3½ pks. of wheat, at £2 4s. 6d. a quarter.
26. Find the cost of 18 cwt. 1 qr. 18 lbs. at £8 12s. 4d. per ton.
27. Find the quantity of alloy in 714 oz. 10 dwts. 20 grs. of bullion, containing 10 oz. 17 dwts. 14 grs. of pure silver in the lb.
28. Find how much must be paid on a debt of £759 19s. 2d. at 13s. 7½d. in the pound.
29. How much income-tax must be paid on an income of £756 18s. 6d. at 1s. 2d. in the pound?
30. Standard gold being worth £3 17s. 10½d. per oz. Troy, what will be the price of 2 lbs. 9 oz. 6 dwts. 16 grs.?
31. Find the value at £3 6s. 5d. per oz. of 13 lbs. 9 oz. 3 dwts. of gold dust.
32. Required the price of 4 cwt. 2 qrs. 16 lbs. at £4 12s. 5½d. per cwt.
33. What is the expense of purchasing 8 tons 2 cwt. 3 qrs. 16 lbs. of iron, at £3 10s. 6d. per cwt.?
34. Required the cost of 1190 poles 2 yds. 2 ft. of fencing, at £1 6s. 6d. per pole.
35. How much will 83 miles 3 furs. 30 po. 2½ yds. of telegraph wire amount to, at £15 14s. 6½d. per mile?
36. Find the amount of a labourer's wages in 5 yrs. 12 months 3 wks. at £2 5s. 6d. per month.

37. What is the cost of painting 49 square yds. 1 ft. 82 in. at £1 8s. 9½d. per square yard?
38. Required the value of 9 cubic yards 21 ft. 432 in. of timber, at £4 14s. 6d. per cubic yard.
39. How much will it cost to replace a cistern, if £1 11s. 6d. per cwt. be allowed for the lead of the old one, which weighs 6 cwt. 1 qr. 10 lbs., the new one weighing 8 cwt. 2 qrs. 14 lbs., and new lead being £2 0s. 6d. per cwt.?
40. If a lb. of silver costs £3 6s. what is the price of a salver which weighs 7 lbs. 7 oz. 10 dwts., subject to a duty of 1s. 6d. per oz. and an additional charge of 1s. 10d. per oz. for workmanship?

SIMPLE PROPORTION.

Ex. XLII.

1. Complete the following proportions :

$$\begin{array}{l} (1.) \frac{2}{3} : \frac{3}{5} :: \frac{7}{6}; \\ (2.) \frac{1}{21} : 2\cdot5 :: 5\frac{1}{4}; \\ (3.) .0004 : 1\cdot4 :: .02; \\ (4.) 1\cdot0004 : 1\cdot4 :: .02. \end{array}$$

2. Find a magnitude having the same ratio to 2·4167, that £7 10s. has to £8 17s. 6d.
3. Find a fourth proportional to £7 10s., $\frac{2}{3}$ of $\frac{2}{3}$ of £5, and .016.
4. How much gold dust can be purchased for £1073 9s. 6d. at £3 5s. per ounce?
5. If 7 cwt. 1 qr. 6 lbs. cost £7 7s. 5½d., what is the cost per cwt.?
6. If a labourer earn 1s. 9d. a-day, when wheat is at 7s. a bushel, what ought he to receive when wheat is at 9s. a bushel?
7. If the progress of sound be uniformly 1142 feet per second of time, in what time will the report of a piece of ordnance be heard at the distance of 13 miles?
8. If $\frac{2}{3}$ of an estate be worth £1003 17s. 1d., what is the value of $\frac{2}{3}$ of it?
9. How much in the pound is £603 15s. out of £840?
10. If 4½ oz. of tea cost 8½s., what will 30½ lbs. cost?
11. The gold in a sovereign is 22 carats fine; if instead it were 22½ carats fine, how much would the coin be worth?

12. What is the value in English money of 1556·85 francs, when the exchange is at 24·25 francs for £1?

13. A bankrupt's debts amount to £739 10s., and his assets to £640 9s.; how much in the pound can he pay?

14. A bankrupt owes *A* £1250, *B* £3275, and other creditors £3525, and *A* finally receives £250; what is the value of the bankrupt's property, and how much is paid in the pound?

15. A bankrupt owes three creditors *A*, *B*, and *C*, £10000, 10000 guineas, and 10000 shillings respectively; and he has property to the amount of £7000; find how much he will pay in the pound, and how much each creditor will receive.

16. A creditor receives on a debt of £296 a dividend of 12s. 4d. in the pound, and he receives a further dividend upon the deficiency of 3s. 9d. in the pound; what does the creditor receive in the whole?

17. What is the income corresponding to an income-tax of £13 2s. 6d. at the rate of 7d. in the pound?

18. A person after paying a poor-rate of 10d. in the pound, has £728 6s. 8d. remaining; what had he at first?

19. A person pays 7d. in the pound for income-tax on his income, and then has £563 1s. 8d. remaining; what had he at first?

20. A man has an income of £200 per annum; an income-tax is established of 7d. in the pound, while a duty of 1½d. per lb. is taken off sugar; what must be his yearly and daily consumption in order that he may just save his income-tax?

21. If 13½ English ells of cloth cost 15½ guineas, how many yards of the same can be bought for £36 17s. 6½d.?

22. If a penny loaf weigh 8 oz. when wheat is at 15s. a bushel, what must be the price of wheat when a twopenny loaf weighs 17 oz.?

23. The proprietor of $\frac{1}{4}$ of a mine sold $\frac{1}{6}$ of his share for £7000; what should he who owns $\frac{2}{3}$ of the same mine get for $\frac{5}{6}$ of his share?

24. A bankrupt's assets are £663 12s., out of which he pays 15s. in the pound on half his debts, and 12s. on the other half; find the amount of his debts.

25. If 1lb. Avoirdupois be equal to 7000 grains Troy, and if 6144 sovereigns weigh 133lbs. 4 oz. troy, how many sovereigns will weigh an Avoirdupois ounce?

26. If 175lbs. Troy are equivalent to 144 lbs. Avoirdupois, how much Troy weight is equivalent to 3 cwt. 3 qrs. 20 lbs. Avoirdupois?

27. The large-grained powder of the English service weighing 55·5

lbs. per cubic foot ; find (1) the number of cubic inches which would be occupied by 1 oz. of this powder, and (2) the weight of 1152 cubic inches.

28. In the copper coinage 24 pence are made from an Avoirdupois pound of copper ; find the weight of a newly-coined penny (1) in drams Avoirdupois, and (2) in grains Troy, an ounce Avoirdupois containing 16 drams Avoirdupois or $43\frac{1}{2}$ grains Troy.

29. A person buys 3 cwt. 1 qr. of a certain article at £2 per cwt., and 5 cwt. 3 qrs. 8 lbs. at £2 10s. per cwt. ; at what price per cwt. may he sell the whole, so as neither to gain nor lose ?

30. A person purchases 2 cwt. $17\frac{1}{2}$ lbs. of a certain article at £5 per cwt. ; but in consequence of its being damaged, the price is afterwards reduced to 8d. per lb. ; how much money will be returned to him ?

31. If the lb. weight of standard silver (composed of 222 dwts. of pure silver and 18 of alloy) be coined into 74 shillings, and the lb. weight of standard gold (composed of 220 dwts. of pure gold and 20 of alloy) be coined into 44 sovereigns ; find the value of an ounce of pure silver, and how many ounces of pure silver are worth an ounce of gold.

32. A garrison of 360 men have provisions for 6 months ; but hearing of no relief at the end of 5 months, find how many men must depart that the provisions may last as much longer.

33. A man who works 10 hours a day does a piece of work in $4\frac{1}{2}$ days ; how many hours a day must he work to finish it in 4 days ?

34. A garrison of 1000 men, which was victualled for 60 days, was reinforced at the end of 18 days, and then the provisions were exhausted in 30 days ; required the number of men in the reinforcement.

35. A stationer bought 138 reams of paper at 10s. a ream, of which he retained 18 reams for his own use ; at what price per ream must he sell the remainder that he may have his own for nothing ?

36. If a grocer buy 7 cwt. 3 qrs. 14 lbs. of sugar for £9 10s. 6d., and retain 1 cwt. 1 qr. 5 lbs. for his own use, at what price per cwt. must he sell the remainder so as to get his own for nothing ?

37. A clock gains $3\frac{1}{2}$ minutes per day ; how should its hands be placed at noon that it may give the true time at half-past eleven at night ?

38. If 50 women or 33 men can reap a field of corn in 7 days, in what time can 40 men and 20 women together reap the same ?

39. If 14 men or 18 women or 24 boys can complete a piece of work in 29 days, in what time will 28 men and 9 women and 24 boys together do the same ?

40. If 1 lb. Avoirdupois be equivalent to 7000 grains Troy, and 1869 sovereigns weigh 40 lbs. Troy, how many sovereigns will weigh an Avoirdupois ounce ?

41. If a treasure of silver was worth £1800000 in the reign of Henry VII., when silver was £1 17s. 6d. per lb. Troy, what is it worth when silver is 5s. 6d. per oz. ?

42. An income-tax of 7d. in the pound is paid by 800,000 persons, and realizes the sum of £5,000,000 ; what is the average income of the tax-payers ?

If 2,000,000 more persons subscribed to the tax, whose average income is £100, by how much would the rate per pound be reduced, if the same sum as before be obtained ?

43. A watch which loses 2 minutes 5 seconds in a day, is set 9 minutes 20 seconds too fast on Monday at noon ; what time will it indicate on the succeeding Friday at midnight ?

44. If a train travel 171 miles in 5 hours when the stoppages amount to 3 minutes per hour, how far will it travel in 7 hours when 5 minutes per hour are lost by delays on the road ?

45. If an ounce Troy of standard gold, of which $\frac{1}{12}$ part is alloy, be worth £3 7s. 10 $\frac{1}{2}$ d., what is the value of 112 lbs. Avoirdupois of Australian gold containing only $\frac{1}{16}$ part alloy ?

46. A railway train started 10 minutes ago towards a station 10 miles distant, at the rate of 25 miles an hour, and will stop 1 minute at the station ; how many miles an hour must an express train now starting travel, so that it may get to the station just as the other train is leaving ?

47. *A* and *B* run a race of 605 yards, and they run at the rate of 11 miles and $8\frac{1}{2}$ miles an hour respectively ; what start can *A* allow *B*, so as just to win the race by 1 yard ?

48. *B* was $1\frac{1}{4}$ mile in advance of *A*, when *A* started in pursuit of him at the rate of 11 miles an hour, while *B* can only run $9\frac{1}{2}$ miles an hour ; how far can *B* run before he is caught ?

49. A person mixes 86 lbs. of coffee with 29 lbs. of chicory, the ratio of their values being as 1 : $\frac{1}{6}$; at what does he value the coffee and chicory respectively if he sells the mixture at 1s. 8d. per lb. ?

50. A grain of gold can be beaten into a leaf of 56 square inches ; how many of these leaves will make an inch in height, supposing a cubic foot of gold to weigh 10 cwt. 95 lbs. Avoirdupois ?

COMPOUND PROPORTION.

Ex. XLIII.

1. If 7 men earn £9 10s. 6d. in $10\frac{1}{2}$ days, what sum will 28 men earn in $31\frac{1}{2}$ days?
2. If 819 men will consume 351 quarters of wheat in 5 months, how many will consume 1464 quarters in 7 months?
3. If the carriage of 60 cwt. for 20 miles cost £14 10s., what weight can be carried 30 miles for £5 8s. 9d.?
4. If 20 men could perform a piece of work in 12 days, required the number of men who could accomplish another work three times as great in $\frac{1}{3}$ part of the time?
5. If 10 men can reap a field of corn of $7\frac{1}{2}$ acres in 3 days of 12 hours each, how long will it take 8 men to reap 9 acres, working 16 hours a-day?
6. If 3 men working 11 hours a-day can mow 20 acres in 11 days, how many men working 12 hours a-day will mow a field 384 yards long and 300 yards broad in 4 days?
7. If 1500 copies of a book of 11 sheets require 66 reams of paper, how much paper will be required for 5000 copies of a book of 25 sheets of the same size as the former?
8. The wages of 10 men for 5 weeks being £27 10s., how many weeks will 3 men work for £33?
9. If 858 men in 6 months consume 234 quarters of wheat, how many quarters will be required for the consumption of 979 men for three months and a half?
10. If it cost £59 2s. $1\frac{1}{2}$ d. to keep 3 horses for 7 months, what will it cost to keep 2 horses for 11 months?
11. The carriage of 4 cwt. 3 qrs. for 160 miles costs £3 17s.; what will the carriage of 11 cwt. 3 qrs. 14 lbs. cost for 100 miles?
12. If 25 men do a piece of work in 24 days working 8 hours a day, in how many days would 30 men do the same piece of work working 10 hours a day?
13. If 25 labourers can dig a ditch 220 yards long, 3 ft. 4 in. wide, and 2 ft. 6 in. deep, in 32 days, when the day is 9 hours long, how many labourers would be able to dig a ditch half a mile long, 2 ft. 4 in. deep, and 3 ft. 6 in. wide, in 36 days, when the day is 8 hours long?

14. If 120 men in 3 days of 12 hours each can raise an embankment 30 yards long, 2 feet broad, and 4 feet high, how many men will be required to raise an embankment 50 yards long, 6 feet high, and a yard and a half broad, in 9 days of 15 hours each ?

15. If 3 men working 8 hours a day, can build a wall 8 yards long in 6 days, what time will 7 men take to build a wall 14 yards long, of the same thickness, but twice the height, supposing them in this case to work 10 hours a-day ?

This answer to be given in days and hours.

16. A beam 32 feet long, $1\frac{1}{2}$ foot broad, and 1 foot thick, costs £4 ; what will be the cost of a beam 14 feet long, $2\frac{3}{4}$ feet broad, and 6 inches thick ?

17. If the carriage of 15 tons 17 cwt. 1qr. of goods for $257\frac{1}{4}$ miles cost £16 6s. $7\frac{1}{2}$ d., what weight at the same rate will be carried $211\frac{1}{2}$ miles for £21 15s. 6d. ?

18. If 136 labourers can dig a trench 48 yards long, 1 ft. 3 in. broad, and 3 ft. 4 in. deep, in 5 days of 6 hours each, how many men would be required to dig a trench 90 yards long, 2 ft. 6 in. broad, and 3 ft. deep, in 27 days of 10 hours each ?

19. If 9 workmen, working 8 hours a-day, take 24 days to dig a ditch 65 yards long, 13 broad, and 5 deep, in how many days will 72 workmen dig a ditch 327 yards in length, 18 in breadth, and 7 in depth, supposing they work 10 hours each day ?

20. If the sixpenny loaf weigh 4·35 lbs. when wheat is at 5·75s. per bushel, what ought to be paid for 49·3 lbs. of bread when wheat is at 18·4s. per bushel ?

21. A person is able to perform a journey of 142·2 miles in $4\frac{1}{2}$ days, when they are 10·164 hours long ; how many days will he be in travelling 505·6 miles, when the days are 8·4 hours long ?

22. If 30 cannon firing 4 rounds in 5 minutes kill 640 men in an hour, how many men would be killed in an hour and a-half, by 10 cannon firing at the rate of 3 rounds in 4 minutes ?

23. If a brass gun weighing 9 cwt. 1 qr. 7 lbs. be worth £93 2s. 6d., when copper is at 1s. 6d. per lb. ; what will be the weight of a gun that costs £137 10s., when copper is at £9 6s. 8d. per cwt. ?

24. When copper is at £5 17s. 6d. per cwt., 175 cwt. 0 qrs. $24\frac{1}{2}$ lbs. of gun-metal can be purchased for £1045 15s. ; what is the price of copper per cwt. when 44 cwt. 2 qrs. 14 lbs. of gun-metal can be purchased for £277 13s. 4d. ?

25. If 3 men or 5 boys can do a certain piece of work in 7 days of 8 hours each, in how many days of 10 hours each can 3 men and 5 boys together do the same ?
26. If 5 men and 7 boys can reap a field of corn of 125 acres in 15 days, in how many days will 10 men and 3 boys reap a field of corn of 75 acres, each boy's work being $\frac{1}{3}$ of a man's ?
27. If 12 oxen and 35 sheep eat 12 tons 12 cwt. of hay in 8 days, how much will it cost per month of 28 days, to feed 9 oxen and 12 sheep, the price of hay being 4 guineas a ton, and 3 oxen being supposed to eat as much as 7 sheep ?
28. If 5 horses require as much corn as 8 ponies, and 15 quarters last 12 ponies for 64 days, how long may 25 horses be kept for £41 5s. when corn is 22 shillings a quarter ?
29. If 30 men in $5\frac{1}{2}$ days can plough 6 rectangular fields the sides of each of which are 40 and 66 yards, how long will 100 men and 50 boys be in ploughing 24 similar fields, the sides of which are 50 and 80 yards each, a boy's being assumed to be one-half a man's work ?
30. If 7 oxen or 12 sheep can feed on a certain field for 6 days, how many days can 18 sheep and as many oxen feed on a field $3\frac{1}{2}$ times as large ?
31. If 1 lb. of gold $1\frac{1}{2}$ fineness cost £46 14s. 6d., what is the value of 7 dwts. 12 grs. at $\frac{216}{1000}$ fineness ?
32. If 150 men dig a trench 230 yards long, 4 wide, and 10 deep, in 12 days, working 10 hours a day, in how long a time will 50 more men dig a trench half as long again, twice as wide, and the same depth, working 12 hours a day ?
33. A wall that was to be raised 36 feet high was raised 9 feet in 6 days by 16 men ; how many more men must be employed to finish it in 4 days ?
34. 6750 tons weight of ammunition are to be removed from a fortress in 7 days ; but it is found that in the first three days 36 horses have only removed 2250 tons ; how many horses are required to carry away the rest in the time specified ?
35. A bank of earth 330 yards long was to be raised by 40 men in 7 days ; but at the end of 5 days only 220 yards were completed ; find how many men should be added to finish the bank in the proposed time.
36. A person contracted to complete 500 yards of railway in 40 days, and hired 120 men for that purpose ; but at the end of 25 days he finds

only 200 yards finished; how many more men must he employ to finish the work in the given time?

37. If 30 men in 84 days of 12 hours each build a wall 700 feet long, 12 feet high, and 2 feet thick, how many men in 72 days of 10 hours each can build a wall 8 feet high and 18 inches thick round a square of 225 feet each side?

38. If 248 men in 5 days of 11 hours each can dig a trench 230 yards long, 3 yards wide, and 2 yards deep, in how many days of 9 hours each will 24 men dig a trench 5 yards wide and 3 deep round a rectangular enclosure 70 yards long and 50 broad?

39. Four men working 8 hours a day take 22 days to pave a road 440 yards long and 35 feet broad; how many days will 4 men, two of whom work 8 hours and two 10 hours a day, take to pave a road 1575 yards long and 36 feet 6 inches broad?

40. If 4 compositors working 11 hours a day take 16 days to set up a work of 315 pages, of 40 lines in a page and 44 letters in a line, what time will 6 compositors, four of whom work 8 hours and two 10 hours a day, take to set up a work of 1575 pages of 45 lines in a page and 52 letters in a line?

PROPORTIONAL PARTS.

Ex. XLIV.

1. Divide £26 4s. 2d. into two parts which shall be to each other as 7 : 13.

2. Divide £714 10s. between *A*, *B*, and *C*, in the ratio of 7, 11, and 17.

3. Divide £156 13s. into parts, in the ratio to each other of 6, 9, and 11.

4. Four persons, *A*, *B*, *C*, and *D*, rent a pasture for £50; *A* puts in 7 cattle, *B* 8, *C* 9, and *D* 10; how much should each person pay for his share?

5. A house and garden cost £850, and the price of the house was to that of the garden as 11 : 5; find the price of each.

6. Three persons agree to subscribe for the purchase of a ship in proportion to the numbers 2, 3, and 4; supposing the vessel cost £48000, what was each man's share of the expense?

7. The gold coinage of Great Britain consists of an alloy composed

of 11 parts of gold and 1 of copper ; how much of each is there in a sovereign, the weight of which is 5 dwts. 2*g*rs.?

8. A contribution of £700 was imposed on four villages, to be paid in proportion to the number of their inhabitants ; the first contained 250 persons, the second 350, the third 400, and the fourth 500 ; find what each village had to pay.

9. Standard silver consists of a mixture of which 18 parts are pure silver and 4 are alloy ; find how much pure silver and how much alloy are contained in a mass weighing 366 lbs. 14 oz. 10 dwts.

10. A piece of land of 200 acres is to be divided among 4 persons in proportion to their rental from surrounding property ; supposing these rents to be £500, £350, £800, and £90, how many acres must be allotted to each ?

11. A metal is composed of 11 parts gold and 1 copper, another of 5 parts gold and 8 silver, and a third of 12 parts silver and 1 copper. These are mixed together in the ratio of 8, 9, and 10, and the compound weighs 1 cwt. ; how much gold, silver, and copper respectively are contained in the mixture ?

12. Gunpowder being composed of nitre 15 parts, charcoal 3 parts, and sulphur 2 parts, find how much of each is required in making 16 cwt. of powder.

13. Two engines 50 miles apart are approaching each other at the rates of 35 and 45 miles an hour ; how long will it be before they meet ?

14. A legacy of £1000 is left to three individuals in the proportion of 1, 2, and 3 ; find the sum received by each after deducting the legacy duty of 10 per cent.

15. From two stations 112 miles apart, two trains start at 2 hrs. 15 min. P.M. towards each other, one at 25 miles an hour, the other at 32 miles an hour ; at what time will they meet ?

16. The capital of a firm consists of £713 3*s.*, £964 17*s.*, and £2391 3*s.*, subscribed by three partners ; divide £2231 among them in proportion to their several capitals.

17. *A* and *B* agree to divide their travelling expenses in the proportion of the numbers 5 and 7 ; *A* pays on the whole £25 16*s.*, and *B* pays on the whole £15 17*s.* ; what has the one to pay and the other to receive in order to settle the account ?

18. A mixed metal consists of 87 parts pure silver and 13 parts copper ; what is the value of 29 lbs. 2 oz. Troy of this mixture, when

pure silver is at 5*s.* 6*d.* per oz. Troy, and copper at 1*s.* per lb. Avoirdupois ?

19. *A*, *B*, and *C* subscribe £110 10*s.*, £210, and 300 guineas respectively towards a certain transaction, which produced them a clear profit of £120 ; what is each man's share of this profit ?

20. Three pumps draw water from a certain well in quantities as $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$; find how much water has been discharged, when the first pump has drawn 10000 gallons more than the second.

21. *A* and *B* are partners in a business to which they have contributed £1200 and £2000 respectively ; *A* is to have 10 per cent. of the profits for managing the business, and the remaining profits are to be shared in proportion to the capital contributed by each ; the first year's profits are £800 ; how much should each receive ?

22. If in gun-metal the proportion of tin to copper is as 7.75 to 92.25, what is the value of 6 guns, each weighing 7 cwt. 2 qrs. 14 lbs., when tin is at £80 10*s.* per ton, and copper at £80 15*s.* per ton ?

23. Divide 600 guineas into three parts in the ratio of 3 : 5 $\frac{1}{2}$ and 5 : 7 $\frac{1}{2}$.

24. *A* is to *B* as $\frac{1}{2} : 3$, and *B* is to *C* as $3 : 2\frac{1}{2}$; their sum is 183 cwt. 1 qr. 2 $\frac{1}{2}$ lbs. ; find *A*, *B*, and *C*.

25. Two liquids are delivered by two pipes into a vessel ; their velocities are as 4 : 5 ; the magnitude of the pipes as 2 : 3 ; their specific gravities as 15 : 4 ; and the time during which they flow as 7 : 18 ; supposing that one ton of liquid is received into the vessel, find what weight of each liquid the vessel contains.

26. Two lots of cloth which together amount to 204 yards, are in length as 8 to 9, and in price as 10 to 11, and the total value is £134 5*s.* ; required the separate quantities and prices per yard.

INVERSE PROPORTION.

Ex. XLV.

1. *A* can reap a field in 30 days, and *B* in 20 days ; in what time can they reap it together ?

2. *A* can perform a piece of work in 4 days, which *B* can perform in 5 ; in what time can they complete it together ?

3. If one cock will empty a cistern in 15 minutes, and another fill it in 8 minutes, and both be opened together when the cistern is empty, in how many minutes will it be filled ?

4. A canal is filled by one sluice in 12 days, and by another in 4 days ; in what time will it be filled by both together ?

5. *A*, *B*, and *C* together have done a piece of work in 3 days ; *B* alone has done it in $6\frac{1}{2}$ days, and *C* alone in $8\frac{1}{2}$ days ; in what time may *A* alone undertake to do it ?

6. It being given that *A* and *B* can do a piece of work in $2\frac{8}{11}$ days ; that *A* and *C* can do the same in $2\frac{1}{12}$ days, and that *B* and *C* can do it in $3\frac{3}{13}$ days ; find the time in which *A*, *B*, and *C* would do the work, working first all together, and secondly separately.

7. *A* and *B* can do a piece of work in 10 days, *A* and *C* in 12 days, *B* and *C* in 15 days ; in what time can they do it jointly and separately ?

8. *A* can do a piece of work in $7\frac{1}{2}$ days, *B* can do the same in $6\frac{1}{2}$ days, and the two together, with the assistance of *C*, can do it in $2\frac{1}{2}$ days ; in what time can *A* and *B* do it without *C*'s assistance, and in what time can *C* alone do it ?

9. A cistern has four cocks, two of which are designed to fill it and two to empty it. If it be empty, No. 1 alone will fill it in 6 hours, or No. 2 alone in 5 hours ; when full, No. 3 alone will empty it in 4 hours, and No. 4 in 8 hours. Supposing the cistern to be full, in what time will it be emptied if all the cocks are set open at the same time ?

10. *A*, *B*, and *C* do a piece of work in 12 hours, *A* and *B* do the same in 16 hours, and *A* and *C* in 18 hours ; in what time will each do it separately, and how long will *B* and *C* take to do it ?

11. *A* can do with *B*'s assistance a piece of work in 5 days, which he can do with *C*'s assistance in 6, and which *B* and *C* together can do in 7 days ; find how long *A* would take to do it with the assistance of both *B* and *C*, and also how long he would take to do it alone.

12. *A* and *B* together can reap a field in 12 days ; *B* and *C* together in 13 days ; but if a boy *D* helps, then they will finish the work as soon as *A* and *B* can ; what time would *D* alone take ?

13. Three agents, *A*, *B*, and *C* can produce a given effect in 5 days ; *A* and *B* can produce it in 6 days, and *A* and *C* in $7\frac{1}{2}$ days ; in what time can *B* and *C* produce it ?

14. *A* and *B* can plough a field in 3 days, *A* and *C* in $2\frac{1}{2}$ days, and *B* and *C* in 2 days ; how long will *A*, *B*, and *C*, together take to plough a field half as large again ?

15. If *A* can by himself perform a certain quantity of work in 5 days, *B* twice as much in 7, and *C* 4 times as much in 11 days ; in what time can *A*, *B*, and *C* together perform 3 times the original quantity ?

16. A vessel may be filled from a certain pipe in 5 hours, from another in 6 hours, and from another in 12 hours ; how long will it take to fill the vessel when the last pipe runs for one hour, and the others till the vessel is filled ?

17. *A* can do a piece of work in $6\frac{1}{2}$ days, *B* in $5\frac{1}{2}$ days, and *C* in $4\frac{1}{2}$ days ; in what time would they together finish a work $3\frac{1}{2}$ times as great, supposing them to work 8 hours a-day instead of 10 ?

18. *A* can dig a certain trench in 5 hours, *B* in 9 hours, and *C* in 15 hours ; how long would *A* and *B* take to dig the trench, *C* working for 1 hour ?

19. Two pipes supply water to a cistern, one of which would fill it in 3 hours and the other in 4 hours 20 minutes ; and there is a third pipe which would empty the cistern in $5\frac{1}{2}$ hours ; supposing them all to be open, in what time will the cistern be filled ?

Also, supposing that at the end of $\frac{3}{4}$ of an hour the third pipe is closed, in what time from the commencement will the cistern be filled ?

20. If *A* can do as much work in 5 hours as *B* can do in 6 hours, or as *C* can do in 9 hours ; how long will it take *C* to complete a piece of work, one-half of which has been done by *A* working 12 hours and *B* working 24 hours ?

THE CHAIN RULE.

Ex. XLVI.

1. If 14 of *A* count for 15 of *B*, and 18 of *B* for 21 of *C*, and 24 of *C* for 25 of *D*, and 30 of *D* for 32 of *E* ; how many of *E* count for 108 of *A* ?

2. If 13 cubic feet will hold 81 gallons, and 16 pints are equal to 15 sextarii, and 7 sextarii are equal to 6 chœnices ; how many chœnices are there in 910 feet ?

3. If 12 oxen are worth 29 sheep, 15 sheep worth 25 hogs, 17 hogs worth 3 loads of wheat, and 8 loads of wheat worth 13 loads of barley ; how many oxen must be given for 1885 loads of barley ?

4. If $19\frac{1}{2}$ ounces of platina are worth 23 of gold, and 21 ounces of gold are worth 38 of silver, and 9 ounces of silver are worth 11 of copper, and 23 ounces of copper are worth 27 of iron ; how many ounces of iron are worth 819 ounces of platina ?

5. If Jupiter's first satellite performs 15 revolutions while the

second performs 7, and the second revolves 31 times while the third revolves 16 times, and the third revolves 40 times while the fourth revolves 17 times ; how many revolutions will the first perform while the last makes 476 revolutions ?

6. What sum in English money must be given for 500 francs when 25·6 francs are exchanged for £1 ? What is the rate of exchange between London and Paris when 3 francs = 480 rees, 400 rees = 3½ shillings Flemish, and 35 shillings Flemish = £1 ?

7. If 2 horses on a tram-road can move as much as 5 horses on a common road, and 20 men can move as much as 3 horses on a tram-road ; how many men can move as much as 30 horses on a common road ?

8. In Austria 120 gulden (paper currency) are worth 100 silver gulden ; what amount of paper money should be obtained for £10 sterling, if the value of £1 be 9 gulden 30 kreutzers in silver (60 kreutzers = 1 gulden) ?

9. The rates of exchange being as follows :

$$\begin{aligned} \text{£1 English} &= 25\cdot4 \text{ French francs,} \\ 3\cdot75 \text{ francs} &= 105 \text{ kreutzers,} \\ 60 \text{ kreutzers} &= 1 \text{ florin,} \end{aligned}$$

and the price of posting in Germany being $1\frac{1}{2}$ florins per German mile, which = $4\frac{1}{2}$ English miles ; find the cost in English money of posting 381 English miles in Germany.

10. A person in London owes another in St. Petersburgh a debt of 460 rubles, which must be remitted through Paris. He pays the requisite sum to his broker at a time when the exchange between London and Paris is 23 francs for £1, and between Paris and St. Petersburgh 2 francs for one ruble. The remittance is delayed until the rates of exchange are 24 francs for £1, and 3 francs for 2 rubles ; what does the broker gain or lose by the transaction ?

INTEREST.

Ex. XLVII.—CASE I.

1. Find the interest of £427 10s. 6d. at 3½ per cent. for $2\frac{3}{4}$ years at simple interest.

2. What is the simple interest of £267 16s. for $3\frac{1}{2}$ years, at 4½ per cent. ?

3. What is the simple interest of £98 15s. 10d. for $\frac{1}{2}$ a year at $2\frac{1}{2}$ per cent.?
4. Find the simple interest of £237 5s. 6d. for $3\frac{3}{4}$ years at $4\frac{1}{4}$ per cent.?
5. What is the amount of £375 at $3\frac{1}{4}$ per cent. simple interest for $2\frac{3}{4}$ years?
6. Find the amount of £2736 10s. 6d. at simple interest, for 8 years at $3\frac{1}{2}$ per cent.
7. The sum of £192 15s. 7d. is put out at simple interest for $3\frac{1}{2}$ per cent.; what will it accumulate to in 7 years?
8. What is the difference between the simple interest of £50 19s. for 7 years at 3 per cent., and for 8 years at $2\frac{1}{2}$ per cent.?
9. A person has £1750 stock in the $3\frac{1}{4}$ per cents.; what will be his annual loss, if the interest be reduced to 3 per cent.?
10. What will £569 5s. 5d. amount to in $4\frac{1}{2}$ years, at $3\frac{1}{4}$ per cent. simple interest?
11. Find the amount of £781 5s. in two years, at 4 per cent. compound interest.
12. What is the amount of £666 13s. 4d. in 4 years, at 5 per cent. compound interest?
13. Find the interest on £10000 for 4 years at 3 per cent. compound interest.
14. *A* and *B* each lend £256 for 3 years at $4\frac{1}{2}$ per cent., one at simple interest, the other at compound interest; find the difference of the amount of interest they respectively receive.
15. Find the difference between the simple and compound interest of £248 for 3 years at $3\frac{1}{2}$ per cent.
16. Required the amount of £370 10s. in 3 years, at $4\frac{1}{4}$ per cent. compound interest.

Ex. XLVIII.—CASE II.

1. Find the simple interest of £137 10s. at $3\frac{1}{4}$ per cent. for 219 days.
2. Find the simple interest of £1825 at 4 per cent. for 5 days.
3. Required the amount of £43800 for 13 days at 5 per cent. simple interest.
4. Required the simple interest of £788 2s. 6d. for 3 years and 62 days, at 4 per cent.

5. What is the interest of £913 1s. 8d. from May 1st to October 21st in the same year, at $5\frac{1}{4}$ per cent. ?
6. Find the interest of £2250 10s. 6d. for 4 years and 5 months at $3\frac{1}{2}$ per cent. simple interest.
7. What is the simple interest of £200 for 125 days at $4\frac{2}{3}$ per cent. ?
8. Find the simple interest of £675 3s. 4d. at $4\frac{1}{4}$ per cent. for 9 years and 215 days.
9. What is the amount of £852 6s. 8d. in 6 years and 245 days, at $5\frac{1}{4}$ per cent. simple interest ?
10. What is the amount of £17 5s. for 70 days at 4 per cent. simple interest ?
11. Required the simple interest on £945 3s. 4d. at $4\frac{1}{2}$ per cent. from June 20th, 1855, to April 25th, 1856.
12. If £2075 were put out to interest at $6\frac{2}{3}$ per cent. on May 10th, 1854; what would it have amounted to by March 25th, 1855 ?

Ex. XLIX.—CASE III.

1. In what time will £365 amount to £424 6s. 3d. at $3\frac{1}{4}$ per cent. simple interest ?
2. In what time will £142 10s. amount to £227 5s. 9d. at $3\frac{1}{2}$ per cent. simple interest ?
3. In what number of years will £456 10s. double itself at $7\frac{1}{2}$ per cent. simple interest ?
4. At what rate per cent. will £157 15s. 4d. amount to £295 16s. 3d. in 25 years, simple interest ?
5. The simple interest of £40 for $4\frac{1}{2}$ years is 6 guineas ; deduce the rate per cent.
6. At what rate per cent. simple interest will the interest of £375 amount to £63 5s. $7\frac{1}{2}$ d. in $4\frac{1}{2}$ years ?
7. Find what sum of money will amount to £3502 15s. $0\frac{1}{2}\frac{2}{3}$ d. in 7 years at 4 per cent. simple interest.
8. What principal will amount to £455 13s. in $7\frac{1}{2}$ years, at 4 per cent. simple interest ?
9. What sum will produce for interest £56 14s. in $2\frac{1}{4}$ years, at $4\frac{1}{2}$ per cent. simple interest ?
10. In what time will £721 10s. amount to £841 10s. at $3\frac{1}{2}$ per cent. ?

11. If £250 amount to £278 8s. 9d. in $3\frac{1}{2}$ years, what is the rate per cent. simple interest?
12. What principal put to interest for $5\frac{1}{2}$ years, at $2\frac{1}{2}$ per cent. simple interest, will amount to £1000?
13. Find the rate per cent., simple interest, when £450 amounts to £509 1s. 3d. in $3\frac{1}{2}$ years.
14. In what time will £1000 treble itself at $4\frac{1}{8}$ per cent. simple interest?
15. In how many years would £1 become £100 at 5 per cent. simple interest?
16. The sum of £2050 was lent to a certain Company at simple interest; find how much interest was due at the end of 3 years, supposing the rate of interest for the first year was $4\frac{1}{2}$ per cent., for the second 4 per cent., and for the third $3\frac{1}{2}$ per cent. Find also the uniform rate per cent. at which £2050 would produce in 3 years the same amount of interest.
17. What principal in 15 years at 4 per cent. simple interest, will amount to the same sum as £4500 in 9 years at 6 per cent.?
18. A person owes £4000, bearing interest at 5 per cent. per annum, and he pays at the end of each year for interest, and in part payment of the principal, £500; find the amount of his debt at the end of the third year.
19. A certain sum of money lent at simple interest amounts to £1071 in 6 months, and in 16 months its amount would be £1106; find the sum lent, and the rate per cent. of the interest.
20. A banker borrows money at $3\frac{1}{2}$ per cent. simple interest, and lends it out again at the rate of 5 per cent., and by this means gains £200 a-year; how much does he borrow?
21. Which is the greater rate of interest, £7 for the use of £145 for a year, or £4 10s. for the use of £91 5s. for a year?
22. When $4\frac{1}{2}$ per cent. simple interest is allowed for money, find the ratio of amount to capital at the end of $3\frac{1}{2}$ years.

Find also what principal would amount to £7246 10s. at that rate and time.

23. Find the amount accumulated at the end of 3 years by a person who invests £200 now, and does the same at the beginning of each succeeding year, at $3\frac{1}{2}$ per cent. compound interest on the whole sum invested.
24. A person on coming into an annuity of £1000, determines to

save every year one-fifth of his income and invest it; what will be his income in the fourth year after the annuity commences, supposing him to be able to obtain 5 per cent. for the money which he invests?

DISCOUNT.

Ex. L.

1. Find the present worth of £132 3s. due $2\frac{1}{4}$ years hence, at $4\frac{1}{2}$ per cent. simple interest.
2. Find the discount and present worth of £1200 19s. 10d. due 10 months hence, interest being reckoned at 4 per cent.
3. What is the discount on £579 7s. 6d. due 8 months hence, interest being reckoned at $4\frac{1}{2}$ per cent.?
4. Find the discount on £813 9s. due $1\frac{1}{8}$ year hence, at $4\frac{1}{2}$ per cent.?
5. Required the present value of £252 19s. 3d. due a year hence, at $3\frac{1}{2}$ per cent.
6. If a bill of £676 13s. 4d. is due in 6 months, find what would be the payment in ready money, money being worth 3 per cent.
7. What is the present value of £150 due 9 months hence (£100 to be received immediately being considered of equal value with £105 to be received at the end of 12 months)?
8. Find the discount on £83539 7s. 6d. due 30 days hence, at 4 per cent. By how much does the interest of that sum for 30 days exceed the discount?
9. What is the discount on £4068209, due $\frac{1}{5}$ th of a year hence, at $4\frac{1}{2}$ per cent. simple interest?
10. Find the present worth of £60, payable after 6 years, at 5 per cent. simple interest.
11. A bill of £3050 is due 4 months hence; what sum will be deducted if it be paid immediately, interest being calculated at the rate of 5 per cent.?
12. Find the discount on £1639, for $\frac{3}{4}$ of a year, at $3\frac{1}{2}$ per cent. simple interest.
13. Required the discount of £100 for one year, at 5 per cent. simple interest; and the interest on this discount for the same time.
14. What is the discount on a bill of £120 16s. 8d., due 10 months hence, at $4\frac{1}{2}$ per cent.?

15. What sum of money must be paid down in order to receive £360 10s. two years hence, allowing $3\frac{1}{2}$ per cent. simple interest?
16. A bill of £1510 is paid $3\frac{1}{2}$ years before it becomes due; find the discount at 5 per cent. simple interest.
17. Find the discount on £85 10s. for half a year, at 5 per cent. simple interest.
18. What discount would be allowed on £746 17s. 8d. due $2\frac{1}{2}$ months hence, when the interest of money is $4\frac{1}{2}$ per cent.?
19. A bill of £120, due 4 years hence, was discounted for £20; required the rate per cent.
20. If the discount on £678 8s., which is due at the end of a year and a half, be £38 8s., what is the rate per cent. at simple interest?
21. A tradesman marks his goods with two prices, one for ready money, and the other for 1 year's credit, allowing discount at 5 per cent.; if the credit price be £2 9s., what ought to be the cash price?
22. A tradesman marks his goods with two prices, one for ready money, and the other for credit of 6 months; what ratio ought the prices to bear to each other, allowing 5 per cent. simple interest?

STOCKS.

Ex. LI.

1. What income will £395 12s. 6d. produce, when invested in the 3 per cent. Consols, at £90?
2. What sum must be paid for £439 12s. 5d., $3\frac{1}{2}$ per cent. stock, at $92\frac{1}{2}$ per cent.
3. Find the simple interest for $7\frac{1}{2}$ years on £4520 invested in the 3 per cents. when they are at $82\frac{3}{8}$ per cent.
4. Bought £650, 3 per cent. Consols, at $90\frac{3}{8}$ per cent., and paid brokerage $\frac{1}{8}$ per cent.; what did the whole amount to?
5. If £3714 19s. be laid out in purchasing 3 per cent. stock, at $95\frac{1}{2}$, what annual income will be derived from this investment? Would it be more or less advantageous to invest in the $3\frac{1}{4}$ per cents. at $97\frac{1}{4}$?
6. A person invests £20000 in the 3 per cents. at 80; what is his annual income, subject to an income-tax of 1s. 2d. in the pound?
7. A person invests £4620 in the 3 per cent. consols, at 92; what amount of stock does he receive, the brokerage being 2s. 6d. in the pound?

Also what amount does he receive annually from his investment, after deducting an income-tax of 7*d.* in the pound ?

8. When the 3 per cent. Consols are at 95, what amount of stock can be purchased for £3400, the brokerage being 2*s.* 6*d.* per cent.?

Also what income would be realised by the investment, after deducting an income-tax of 7*d.* in the pound ?

9. If a person invests his capital in the 3½ per cents. at 94, at what rate per cent. does he receive interest on his capital ? and what income will he have if he invests £1250 ?

10. If a person receives 4½ per cent. interest on his capital by investing in the 3½ per cents., what is the price of the stock ? and how much stock can be purchased for £1200 ?

11. A person invested money in the 3 per cent. Consols when they were at 90, and some more when they were at 80 ; find the rate of interest he obtained in each case, and the advantage per cent. of the second purchase over the first.

12. Which investment will give the largest annual income—£1000 in £20 shares, when they are at £14½ and pay 5 per cent., or £1000 in shares of £10 guaranteed 6 per cent.?

13. What sum must be invested in the 3 per cent. Consols, at 94½, to yield an annual income of £500 ?

14. If £7927 10*s.* be laid out in purchasing 3 per cent. stock at 94½, what income will be derived from this investment after deducting an income-tax of 7*d.* in the pound ?

15. Which investment will yield the better interest, 3 per cent. at 90½, or 4 per cent. at 120½ ?

16. A person purchases £1000, 3 per cent. Consols, at 96½, and sells out again when they have sunk to 82½; how much does he lose by the transaction ?

17. How much stock can be purchased by the transfer of £1000 stock from the 3 per cents. at 72 to the 4 per cents. at 90 ? and what difference in annual income will be produced by it ?

18. A person purchases £1000, 3 per cent. Consols, at 83½, and sells out again at 97½ ; how much does he gain by the transaction ?

19. If £1000 be laid out in the purchase of 3 per cent. Consols, which are at 81½, at what price must the stock be sold to produce a gain of £100 ?

20. If I sell out of the 3 per cent. Consols at 98½, and buy shares in

a canal yielding 3 $\frac{1}{2}$ per cent., do I gain or lose? and how much on every £100 I sell out?

21. A person invests £962 10s. in the 3 per cents. at 77, and when the funds have fallen 1 per cent. he transfers his capital to the 4 per cents. at 95; find the alteration in his income.

22. How much ought the 3 per cent. Consols to sink below par, in order that a broker may be enabled to obtain 4 per cent. on money?

23. A person invests £1000 in the 3 per cent. Consols, at 90 $\frac{1}{2}$; but the price rising to 91 $\frac{1}{2}$, he transfers his money to the 3 $\frac{1}{2}$ per cents. at 97 $\frac{1}{2}$; what will be the increase in his income?

24. A gentleman selling a mortgage of £800, for which he received 4 $\frac{1}{2}$ per cent. interest, bought £20 guaranteed 5 per cent. shares in the East Indian Railway, when they were at 2 $\frac{1}{2}$ premium; what was the alteration in his income?

25. A person desires to exchange 25 Spanish £100 bonds, and £800 3 $\frac{1}{2}$ per cent. stock, for 3 per cent. Consols; the prices of these securities being 48, 99, and 93 $\frac{3}{4}$ respectively, what quantity of Consols can he obtain?

26. A person invests £1037 10s. in the 3 per cents. at 83, and when the funds have risen 1 per cent. he transfers his capital to the 4 per cents. at 96; find the alteration in his income.

27. A person has £2950 in the Danish 3 per cents. at 75 $\frac{1}{4}$, which he transfers to the Russian 5 per cents. at 110 $\frac{1}{2}$; required the alteration in his income.

28. A person invests £4800 in the 4 per cents. at 80, and at the end of each year invests the dividend which becomes due in the same stock; supposing the funds to remain at 80 for 3 years, find his dividend at the end of the third year.

29. What sum will be saved annually on a national debt of £4,000,000, if the interest be reduced from 3 $\frac{1}{2}$ to 3 per cent.; and if the price of the stock fell in consequence from 101 to 95 $\frac{3}{4}$, by how much would the fundholder's property be diminished?

30. If the 3 per cents. are at 95, and Government offers to receive tenders for a loan of £5,000,000, the lender to receive five millions in the 3 per cents. together with a certain sum in the 3 $\frac{1}{4}$ per cents.; what sum in the 3 $\frac{1}{4}$ per cents. ought the lender to accept?

PROFIT AND LOSS.

Ex. LII.

1. If a tradesman buys cloth at 13s. 4½d. per yard, and sells the same at 14s. 9d. per yard, what is his gain per cent.?
2. A grocer bought 14 lbs. of sugar for 6s. 3d. and resold it at 5½d. per lb.; how much per cent. did he gain?
3. If by selling tea at £33 6s. per cwt. 10 per cent. is gained, what is the prime cost of 2½ cwt.?
4. If when spirits are sold at 16d. a pint, 22½ per cent. is gained, what is the prime cost of 100 gallons?
5. A tradesman buys cloth at 13s. 8d. per yard; at what price per yard must he sell it to gain 12½ per cent.?
6. The selling price is marked on a book; but the publisher deducts 17½ per cent. when selling them to the retail trader; how much per cent. is gained by retailing the books at this rate?
7. How much per cent. is gained by purchasing at 10½ guineas per cwt. and selling at 2s. 3d. per lb.?
8. What is the salary of a clerk if, after deducting 5 per cent. for the superannuation fund, there remains an income of £175 5s.?
9. An agent remitted to his employer £998 15s. which was what he received diminished by ½ per cent.; what was the sum he originally received?
10. A grocer buys 10 cwt. 3 qrs. 21 lbs. of sugar for £30, and pays 12s. 6d. for expenses; at what rate must he sell it per pound to clear 50 per cent.?
11. If 100 lbs. of tea be bought at 4s. 4d. and sold at 5s., and 100 lbs. of sugar bought at 6d. and sold at 7d., what profit per cent. will be realised on the whole outlay?
12. If 100 eggs be bought at three a penny, and 100 more at two a penny, what will be gained or lost per cent. by selling them all together at 5 for 6d.?
13. A bookseller is charged by the publisher 22½ per cent. less than the selling price of the books he buys; if the bookseller lays out £147 10s. with the publisher, how much will he realize by the sale of the books?
14. A pipe of wine costs £98, and contains 65 dozen and 4 bottles; what does it cost per bottle? How much would the price be increased by expenses amounting to 15 per cent. on the first cost?

15. A man sells a horse for £39 12s., and loses 12 per cent. on what the horse cost him ; what did he give for the horse ?

16. A person buys tea at 6s. a lb., and also some at 4s. a lb.; in what proportions must he mix them, so that, selling his tea at 5s. 3d. a lb., he may gain 20 per cent. on each lb. sold ?

17. Bought 513 eggs at 7 for 3d., and as many more at 9 for 3d.; if I retail them at 16 for 6d., how much do I lose, and how much per cent.?

18. By selling oranges at 5 for 2d., half of which were bought at two a penny and the other half at three a penny, what is the gain or loss per cent. ?

19. A man mixes 20 gallons of ale, which has cost him 11d. per gallon, with 65 of beer which has cost him 5d. per gallon; at what price must he sell the mixture in order to gain 20 per cent. on his outlay ?

20. A merchant sells 49 quarters of corn at a profit of 7 per cent., and 84 quarters at a profit of 11 per cent., and if he had sold the whole at a profit of 9 per cent. he would have received £2 10s. 9d. less than he actually did ; what was the price he paid for the corn ?

21. A grocer buys 567 cwt. of sugar at £1 19s. 10½d. per cwt., and mixes it with 1161 cwt. at £2 2s. 6½d.; at what price per lb. must he sell the mixture in order to realize a profit of 12 per cent. ?

22. A merchant has bought a fifty-gallon cask of wine for £37 10s.; supposing it to have lost 3½ gallons, what price per dozen should he ask for the remainder (9 bottles making 2 gallons) in order to gain 15 per cent. ?

23. A mixture of salt and water contains 25 per cent. of salt ; how many gallons of water must be added to 730 lbs. of this mixture that it may contain only 20 per cent. of salt, supposing that a gallon of water weighs 10 lbs. Avoirdupois ?

24. The gross receipts of a railway company in a certain year are apportioned as follows : 52 per cent. to give the shareholders a dividend at the rate of 6½ per cent. on their shares, 43 per cent. to pay the working expenses of the line, and the remainder £25,000 is reserved ; find the capital of the company.

25. A grocer buys 6 chests of tea (containing 84 lbs. each) at 3s. 4d. per lb., and sells one chest so as to gain 25 per cent. In consequence of a reduction in the duty he makes an abatement of 5½d., 7¼d., 9¾d., 11½d., and 1s. 1¼d. per lb. in selling the five remaining chests respectively ; find how much he gains or loses by the transaction.

26. A person purchases 100 shares in a Company for £3500, and ultimately sells at a profit of 23 per cent., after having received four dividends of 27s. 4d., 17s. 4d., 33s. 10d., and 38s. 9d. a share ; by how much do his receipts exceed his outlay ?

27. A farmer rents a piece of land for £120 a-year, and lays out £625 in buying 50 bullocks. At the end of the year he sells them, having expended £12 10s. in labour ; how much per head must he gain by them in order to realize his rent and expenses, and 10 per cent. upon his original outlay ?

28. How much tea at 4s. 9d. per lb. must I give for 28 lbs. of sugar at 9½d., so as to gain 5 per cent. by the exchange ?

29. A grocer buys a chest of tea containing 3 qrs. 5 lbs. at 3s. 2d. per lb., and two chests each containing 2 qrs. 15 lbs. at 3s. 4½d. per lb. ; what will he gain per cent. by selling the mixture at 4s. per lb. ?

30. A man buys 27 sheep for £30, and sells 12 of them at a loss of 3 per cent. ; at what price per sheep must he sell the remainder that he may gain 2½ per cent. on the whole purchase ?

AREAS AND VOLUMES.

Ex. LIII.

1. Multiply duodecimally 16 ft. 5 in. by 13 ft. 7 in.
2. Multiply duodecimally 23 ft. 10 in., 18 ft. 4 in., and 11 ft. 3 in.
3. Multiply 15 ft. 4½ in. by 9 ft. 7¼ in. by duodecimals.
4. Find the product of 5 ft. 7½ in. by 6 ft. 8½ in. both duodecimally, and by taking aliquot parts of the multiplicand.
5. Multiply 17 ft. 2'. 3". lineal measure by 12 ft. 2'. 7". lineal measure, expressing the result in yards, feet, inches, and a fraction.
6. Multiply 27 ft. 2'. 7". square measure, by 9 ft. 7'. 6". lineal measure, and express the result in yards, feet, inches, and a fraction.
7. Find the volume of a cube whose edge is 13 ft. 8 in.
8. Find the square yards in a rectangular surface 111 ft. 6 in. by 17 ft. 9 in. both duodecimally and by taking aliquot parts.
9. A block of stone is 7 ft. 5 in. long, 4 ft. 7 in. broad, and 3 ft. thick ; find duodecimally its solid contents in feet and inches.
10. Required the number of square feet and inches in the floor, and the number of cubic feet and inches in the volume of a room 21 ft. 5 in. long, 16 ft. 6 in. broad, and 10 ft. 8 in. high.

11. How many cubic feet of air are contained in a room 23 ft. 4 in. long, 13 ft. 3 in. broad, and 14 ft. 6 in. high ?
12. Find duodecimally the quantity of carpet required to cover a floor 9 yds. 2 ft. 6 in. in length, and 7 yds. 1 ft. 8 in. in breadth.
13. A certain row of houses stands upon an acre of ground ; the frontage is 300 yards ; what is the depth ?
14. A paling 572 yards long, at 6d. per square foot, costs £257 8s. ; how many feet high is it ?
15. Express 2 ft. $10\frac{1}{4}$ in. lineal measure, and 5 ft. $79\frac{1}{2}$ in. square measure, duodecimally, as feet, primes, &c. ; also, the latter quantity being the area of a rectangle, one of whose sides is the former, find its other side.
16. The area of an oblong room is 260 square feet, and the length of one side is 4 ft. 3 in. ; what is the length of the other side ?
17. A pit is 49 ft. 6 in. long, and 12 ft. 9 in. wide ; how many cubic feet of earth must be dug out in order to lower the surface 4 ft. 2 in. ?
18. What length must be cut off a board $6\frac{3}{4}$ inches wide, that the area cut off may be a square foot ?
19. The floor of a room is 9 yds. 6 ft. 11 in. in area, and its height 9 ft. 5 in. ; find its volume.
20. Find the number of square feet and inches in the floor, and the number of cubic feet and inches in the volume, and the number of square feet and inches in the surface of a room, 23 ft. 10 in. long, 18 ft. 4 in. broad, and 11 ft. 3 in. high.
21. What is the cost of paving a square court 23 yds. 7 in. a side, at one shilling a square foot ?
22. What will be the cost of painting a wall 23 ft. 6 in. by 10 ft. 4 in., at 5s. 6d. per square yard ?
23. Find the expense of carpeting a room 14 ft. 6 in. broad, by 18 ft. 9 in. long, at 4s. 2d. per square yard.
24. What must be paid for carpeting a room 14 ft. 6 in. long, and 10 ft. 4 in. broad, the charge being 10s. 6d. per square yard ?
25. Find the number of yards of paper $\frac{1}{6}$ ths of a yard wide, which will cover the walls of a room 18 ft. long, 12 ft. 9 in. wide, and 10 ft. 8 in. high.
26. Find the area of a floor 15 ft. 7 in. long, by 12 ft. 3 in. broad, by duodecimals ; and find the expense of carpeting it at 4s. 3d. per yard, the carpet being $\frac{3}{4}$ of a yard.
27. A room is 9 ft. 4 in. high, 12 ft. 6 in. broad, and 18 ft. 9 in. long ;

find the expense of hanging the walls with paper $\frac{3}{4}$ yd. wide, at $4\frac{1}{2}d.$ per yard, and of carpeting the floor at $5s. 6d.$ per square yard.

28. A room is 16 ft. 11 in. long, and 13 ft. 3 in. wide; find how many yards of carpet, 2 ft. 3 in. wide, will be required to cover it, and what will be its price at $4s. 7d.$ per yard?

29. How many yards of paper $\frac{3}{4}$ yard wide will be required for a room 9 ft. 7 in. high, 12 ft. 6 in. broad, and 18 ft. 9 in. long; and find the cost of papering it at $7\frac{1}{2}d.$ per yard.

30. Find the cost of paving a street $\frac{1}{4}$ of a mile long, and 53 feet broad, at the cost of $7\frac{1}{2}d.$ per square yard.

31. A cistern is 12 ft. 4 in. long, and 8 ft. 8 in. wide; find how many cubic feet of water must be drawn off in order that the surface of the water may fall 4 ft. 6 in.

32. A gardener has a piece of matting 73 yds. 1 ft. 8 in. long, and 3 ft. 9 in. broad, to cover a wall 94 ft. long and 10 ft. high; how many square feet of wall will be left uncovered?

33. On laying down a bowling-green with sods 2 ft. 6 in. long, by 9 in. wide, it is found that it requires 75 sods to form one strip extending the whole length of the green, and that a man can lay down one strip and a quarter each day; find the space laid down in 8 days.

34. The roller used for rolling a lawn being 6 ft. 6 in. in circumference, by 2 ft. 3 in. wide, is observed to make 12 revolutions as it rolls from one extremity of the lawn to the other; find the area rolled when the roller has passed 10 times the whole length of it.

35. A Turkey carpet, measuring 11 ft. 6 in. by 9 ft. 8 in., is laid down on the floor of a room measuring 14 ft. by 12 ft. 6 in.; determine the quantity of floor-cloth necessary to complete the covering of the area, and its price at $6s.$ per square yard.

36. If a postage-stamp be an inch long, and $\frac{1}{6}$ ths of an inch broad, how many stamps will be required for papering a room, 18 ft. 9 in. long, 16 ft. 10 in. broad, and 10 ft. 6 in. high?

37. A rectangular court is 125 ft. 9 in. long, and 25 ft. 10 in. broad; how many square yards does it contain? And how many square yards are in a footpath 5 ft. 6 in. wide, supposing the footpath to be made quite round the court on the outside of it?

38. How many paving stones, each of them 1 foot long, and $\frac{1}{6}$ ths of a foot wide, will be required for paving a street 45 feet wide, surrounding the outside of a square, the side of which is 225 feet?

39. A room is 20 ft. long, 15 ft. 6 in. broad, and 10 ft. 9 in. high; find

the expense of carpeting the floor at 6s. 8d. per square yard, and of hanging the walls with paper $\frac{3}{4}$ yard wide, at 2s. 6d. per yard.

40. A room 25 ft. 7 in. long, 18 ft. 11 in. broad, and 10 feet. 6 in. high, has two doors, each 7 ft. by 3 ft. 4 in., and 3 windows, each 6 ft. by 4 ft. 3 in.; determine the expense of plastering the walls and ceiling at 10 $\frac{1}{2}$ d. per square yard.

41. In a rectangular court, which measures 96 ft. by 84 ft., there are four rectangular grass plots, measuring each 22 $\frac{1}{2}$ ft. by 18 ft.; find the cost of paving the remaining part of the court at 8d. per square yard.

42. How many yards of paper 1 $\frac{1}{4}$ yard wide, will be required for a room 29 ft. 4 in. long, 18 ft. 7 in. broad, and 10 ft. 3 in. high, supposing the room to have one door 7 ft. 2 in. by 3 ft. 5 in., and 2 windows, each 6 ft. 6 in. by 3 ft. 7 in.; and find the expense of papering it at 1 $\frac{1}{2}$ d. per yard.

43. Determine the cost of raising the four walls of a house that is 27 ft. 6 in. high, 40 ft. 8 in. in front, and whose side walls are 36 ft. 9 in. in length, at 10s. 6d. a square of 100 feet; supposing the house to have two doors, each 7 ft. 6 in. by 4 ft. 7 in., and 24 windows, each 6 ft. 2 in. by 3 ft. 6 in.

44. Find how much sheet lead will be required to line a rectangular cistern 10 ft. 6 in. long, 6 ft. 4 in. wide, and 5 ft. 9 in. deep; and also find the cost of it at 1s. 8d. per square foot.

45. From a beam of timber 4 ft. 3 in. broad by 3 ft. 6 in. deep, a log is cut off containing 119 cubic feet; what would it cost to veneer the entire surface of this at 1s. 1 $\frac{1}{2}$ d. per square foot?

46. A chest is 4 ft. 8 in. long, 3 ft. 6 in. wide, and 2 ft. 9 in. deep; how many square feet of board does it contain? and what is the cost of painting the outside and inside of it at 1s. 6d. per square yard?

The bottom of the outside is not to be painted.

47. How many tiles, 11 $\frac{1}{4}$ in. long by 7 $\frac{1}{2}$ in. wide, will be required to pave an area 18 ft. 9 in. long by 15 ft. 8 in. wide? and what will be the expense of the tiles at $\frac{3}{4}$ d. each, and the cost of laying them down at 9d. per square yard?

48. A plate of metal $\frac{1}{8}$ inch thick was burnished on one side for 11s. 6 $\frac{1}{2}$ d. at 2 $\frac{1}{2}$ d. per square inch; what is the weight of the plate, supposing a cubic foot of the metal to weigh 9000 oz. Avoirdupois; and what is the value of the plate at 11s. 1 $\frac{1}{2}$ d. per lb.?

49. A general, disposing his soldiers in a solid square, finds that he

has 284 men over and above; but on adding one more soldier to each side, he has 25 men too few; required the number in the army.

50. Water is rising in a cellar, whose area is 2000 feet, at the rate of 6 inches an hour, and is already a foot and a half deep. A pump which is able to carry off 1800 cubic feet of water in an hour is worked for 10 minutes at a time, with intervals of rest of 3 minutes; in what time will the whole be drawn off?

SQUARE ROOT.

Ex. LIV.

Find the square root of:

- | | |
|--|--|
| 1. 128881.
2. 38950081.
3. ·0172265625.
4. 240398012416.
5. 97·061904.
6. ·000080948009.
7. ·02.
8. ·001.
9. 9605·9601.
10. ·0054804409.
11. 5·875.
12. 1·075.
13. 12088868379025.
14. ·007.
15. ·031. | 16. 537·4.
17. 7·1836.
18. 9486769·6036.
19. 6414·247921.
20. ·0001695204.
21. ·0172265625.
22. ·00903687890625.
23. ·94563.
24. ·0198.
25. 1·624.
26. $\frac{85}{8}$.
27. 3080 $\frac{1}{4}$.
28. 41 $\frac{1288}{1575}$.
29. $\frac{18}{3}$.
30. 5 $\frac{1}{3}$. |
|--|--|

CUBE ROOT.

Ex. LV.

Find the cube root of:

- | | |
|---|---|
| 1. 32768.
2. 127263527.
3. 8365427.
4. ·001367631.
5. 27054·036008.
6. 231·475544. | 7. 669·921875.
8. 228099131.
9. 230346397.
10. 69426531.
11. 134217728.
12. 31·855013. |
|---|---|

13. 12812904.	21. 5203417.
14. 7256313856.	22. $\frac{729}{140608}$.
15. 10970645048.	23. $\frac{1}{3}$.
16. 001723683599.	24. $\frac{34}{5030.912}$
17. 243087455521.	25. $\frac{65536}{1257.728}$
18. 113028882875.	26. $\frac{16384}{}$
19. 531.244194299.	
20. $\frac{843}{843}$ and $465\frac{1}{4}$.	

MISCELLANEOUS EXAMPLES IN EVOLUTION.

Ex. LVI.

1. Find the square root of the sum of the squares of 2, 4, 6, and 86.
2. Find the square root of $1\frac{1}{2}$ to five places of decimals, and thence deduce the square roots of 6 and $2\frac{2}{3}$.
3. Find the square root of $1\frac{1}{3}$ to five decimal places, and thence derive the square roots of 15, and of $1\frac{7}{20}$.
4. Extract the square root of 7, and thence derive the square roots of $\frac{1}{7}$, $1\frac{1}{4}$, and $\frac{3\frac{1}{2}}{4\frac{1}{2}}$.
5. Extract the cube root of 233.744896, and derive the cube root of this number multiplied by 0.08.
6. Find the number of inches in the edge of a cube, whose solid content is 5359375 cubic feet.
7. Determine the length of the side of a square, which is equal in area to the rectangle, the sides of which are 513 yds. 1 ft. 11 in. and 1628 yds. 11 in.
- How much would it cost to cover the area with turf at $4\frac{1}{2}d.$ per square yard?
- Required the side of a square whose area is equal to that of a rectangle, the sides of which are 47.14 yards and 210 yards.
- A cubical block of stone contains 50653 solid feet; what is the area of its side?
- Find the side of a square field containing 2 acres 121 yards.
- The solid content of a cubical room is 4913 cubic feet; what will be the cost of carpeting its floor at 4s. 6d. a square yard?
- Find the hypotenuse of a right-angled triangle of which the sides are 4 feet and 1 foot 8 inches.

13. If a marble block, 4 yards long, $2\frac{1}{2}$ broad, and $2\frac{1}{4}$ high, weighs 45 tons, what is the side of cubical block weighing 307 tons 4 cwt.?
14. Find a mean proportional between 1089 and 4096; also between .005 and .03125.
15. Extract the 6th root of 282429536481.
16. Find the diagonal of a cube whose solid contents are 12812.904 solid feet.
17. The lengths of the sides of a right-angled triangle are 1164 and 873 yards; find the length of the hypotenuse.
18. The side of a rectangle is 8076 yards, and the diagonal is 8749 yards; find the other side.
19. An oblong plantation containing an acre, ten times as long as it is broad, is cut through its length and breadth by roads 10 feet wide; what is the area occupied by trees?
20. If a rectangular room measures 29 ft. 6 in. long, 16 ft. 3 in. broad, and 12 ft. 4 in. high, what is the distance from one corner of the room to the middle of the ceiling?
21. Find the value of $\frac{3 - 5\sqrt{0164}}{4\sqrt[3]{0164} + \frac{1}{4}\sqrt[3]{216}}$, carrying the square and cube roots to 6 places of decimals, and the final division to 7 places.
-

ANSWERS TO THE EXAMPLES.

Ex. I. (p. 1.)

1. Ten thousand and ten millions, one hundred and one.
2. One thousand seven hundred and eighty-five millions, six hundred thousand and one.
3. Six hundred millions, two hundred and one.
4. Seven hundred millions, twenty thousand and twenty.
5. Thirty billions, nine hundred thousand and ten millions, one hundred and three thousand and four.
6. Two hundred billions, two thousand millions, two hundred thousand one hundred and one.
7. One thousand nine hundred and seventy-eight billions, six hundred thousand and fifty millions, ten thousand and one.
8. One hundred thousand two hundred billions, thirty thousand and forty millions, five hundred thousand six hundred.
9. Seven trillions, sixty thousand and fifty-two billions, one hundred thousand seven hundred and ten millions, four hundred and thirty-one thousand and eight.
10. Twenty-one trillions, three thousand billions, seven hundred and twelve thousand and three millions, forty-seven thousand eight hundred.
11. One trillion, fifty thousand three hundred and twenty billions, ninety-eight thousand one hundred and five millions, seven thousand and thirty-six.
12. Fifty trillions, forty thousand and seventy billions, thirty thousand six hundred and eighty-five millions, nine thousand one hundred and twenty.
13. Eight thousand five hundred and thirteen trillions, seventy-eight thousand four hundred billions, sixty-one thousand three hundred millions, one hundred and eighty thousand one hundred and ninety.
14. Sixty-four trillions, two hundred and one thousand eight hundred and ninety billions, five thousand and seventy millions, three thousand two hundred and eighteen.
15. Eight trillions, two hundred and fifty thousand seven hundred and forty-six billions, two hundred thousand and seventy-eight millions, five hundred and forty-three thousand and twelve.
16. Ninety thousand eight hundred and seven trillions, sixty thousand and fifty billions, forty thousand three hundred millions, twenty thousand one hundred.

Ex. II. (p. 1.)

- | | |
|-------------------------------------|------------------------------------|
| 1. 726. | 9. 4,000,000,004,000,000,040. |
| 2. 7,026. | 10. 20,000,000,000,200,000. |
| 3. 70,206. | 11. 106,080,040,902,050. |
| 4. 90,000,001,002,070. | 12. 7,000,032,005,012,010. |
| 5. 6,000,000,008,003,000. | 13. 13,000,006,400,011,005. |
| 6. 300,000,000,000,070,000,080. | 14. 25,018,000,000,065,040,017. |
| 7. 100,000,000,000,016,000,000,000. | 15. 100,800,002,087,019,030,021. |
| 8. 509,006,001. | 16. 2,056,014,070,500,302,900,613. |

Ex. III. (p. 2.)

- | | |
|-------------------------------|-------------------------------|
| 1. 257364926. | 14. 3743034 49 rem. |
| 2. 929138. | 15. 5000033994 . . . 505 .. |
| 3. 628806. | 16. 2148022189025005312773. |
| 4. 3527959344. | 17. 21027021. |
| 5. 2467760649255. | 18. 780032055 . . . 8580 rem. |
| 6. 34199859739125. | 19. 80304384. |
| 7. 15684752250. | 20. 306495278. |
| 8. 116581345962900. | 21. 5623009. |
| 9. 38180239122 . . . 33 rem. | 22. 67157148372. |
| 10. 187870 27 .. | 23. 32846. |
| 11. 716871. | 24. 554768. |
| 12. 374000052 . . . 3456 rem. | 25. 94760000 miles. |
| 13. 370527 938 .. | |

Ex. IV. (p. 3.)

- | | | |
|---|---|--------------------------------------|
| 1. 7944651. | 2. 3610360. | 3. 758075. |
| 4. 85829 sixpences, 429145 threepenny pieces, | 3433160 threefarthing pieces. | 5. 155289. |
| 6. 50910 $\frac{3}{4}$. | 7. 365112. | 8. 409002. |
| 9. 107310. | 10. 4680. | 11. 13 dys. 15 hrs. 27 mins. 5 secs. |
| 12. 8791 tons. 2 cwt. 3 qrs. 27 lbs. | 13. 9090. | |
| 14. 2 tons. 14 cwt. 2 qrs. | 15. 3 cub. yds., 108 sq. yds., 3888 lin. yds. | |
| 16. 58547145600 seconds. | | |

Ex. V. (p. 4.)

- | | |
|--|--|
| 1. £2929 18s. 3 $\frac{3}{4}$ d. | 8. 1331 lbs. 2 oz. 18 dwts. 13 grs. |
| 2. £1008 13s. 7d. | 9. 229 lbs. 10 oz. 2 drs. 1 scr. 12 grs. |
| 3. £635 17s. 10d. | 10. 1080 yrs. 77 dys. 12 hrs. 6' 2". |
| 4. £3148 16s. 11d. | 11. 6088 acres, 3 ro. 30 po. |
| 5. 36 yds. 2 ft. 6 in. | 12. 856 qrs. 4 bus. 2 pks. 1 gal. |
| 6. 57 yds. 3 qrs. 2 nls. | 13. 3466 c. yds. 19 ft. 1289 in. |
| 7. 1348 tons, 2 cwt. 3 qrs. 17 lbs. | |
| 14. 1377 tons, 6 cwt. 0 qrs. 21 lbs. 1 oz. 14 drs. | |
| 15. 7 hrs. 34 mins. | |

Ex. VI. (p. 5.)

- | | |
|-----------------------|---------------------------------------|
| 1. £670 8s. 6d. | 16. £5741994 0s. 0½d. |
| 2. £360131 16s. | 17. £3365838 4s. 9d. |
| 3. £1895567 6s. 2½d. | 18. £4945574 12s. 9½d. |
| 4. £1726670 19s. 7½d. | 19. £3686964 5s. 4½d. |
| 5. £185649 7s. 8½d. | 20. £9710368 19s. 2½d. |
| 6. £650399 9s. 4½d. | 21. £1818252 5s. 0½d. |
| 7. £2676638 8s. 6d. | 22. £5184475 14s. 4½d. |
| 8. £624950 12s. 5d. | 23. £1737892 8s. 1½d. |
| 9. £668222 0s. 1¼d. | 24. 23200 lbs. 1 oz. 14 dwts. 6 grs. |
| 10. £3241707 15s. 9d. | 25. 317135 lbs. 6 oz. 7 dwts. 12 grs. |
| 11. £4547262 5s. 1d. | 26. 138812 tons, 10 cwt. 2 qrs. |
| 12. £7301748 6s. | 27. 217 cwt. 0 qrs. 9 lbs. 9 oz. |
| 13. £6184925 4s. 5d. | 28. 58517 ms. 7 furs. 0 po. 4 yds. |
| 14. £5671750 5s. 5½d. | 29. 2022 wks. 2 dys. 13 hrs. 6 mins. |
| 15. £4797085 4s. 4½d. | 30. 2898 acres, 3 ro. 7½ po. |

Ex. VII. (p. 6.)

- | | |
|---|-------------------------------------|
| 1. £55 13s. 1d. | 18. £70 2s. 11½d. ... 297 rem. |
| 2. £51 19s. 1½d. | 19. £910 8s. 9d. ... 435 .. |
| 3. £1056 7s. 11d. ... 6 rem. | 20. £989 4s. 2½d. ... 343 .. |
| 4. £24 13s. 6½d. ... 82 .. | 21. £208 8s. 11½d. ... 9389 .. |
| 5. £36 4s. 10½d. ... 255 .. | 22. £48 10s. 5½d. ... 1880 .. |
| 6. £368 16s. 7½d. ... 11 .. | 23. £874 8s. 11½d. ... 3908 .. |
| 7. £1053 6s. 8d. | 24. £174 8s. 9½d. ... 484 .. |
| 8. £639 12s. 2½d. ... 102 rem. | 25. £510 7s. 11½d. ... 2002 .. |
| 9. £1440 12s. 5½d. ... 35 .. | 26. £261 8s. 5½d. ... 1840 .. |
| 10. £456 0s. 0d. ... 50 .. | 27. £39 9s. 5½d. ... 128 .. |
| 11. £92 16s. 8½d. ... 262 .. | 28. £144 14s. 11½d. ... 1551 .. |
| 12. £243 18s. 4½d. ... 191 .. | 29. £350 15s. 6½d. ... 999 .. |
| 13. £83 13s. 4d. ... 443 .. | 30. £97 13s. 7½d. ... 7017 .. |
| 14. £38 19s. 6d. ... 669 .. | 31. 95 lbs. 6 oz. 16 dwts. 18 grs. |
| 15. £79 1s. 6½d. ... 93 .. | 32. 7 lbs. 3 oz. 9 dwts. 7 grs. |
| 16. £78 18s. 9d. ... 110 .. | 33. 33 tons, 17 cwt. 3 qrs. 14 lbs. |
| 17. £88 15s. 8d. ... 190 .. | 34. 76 cwt. 1 qr. 11 lbs. 15 oz. |
| 35. 9 mi. 0 furs. 23 po. 3 yds. 2 ft. 6 in. ... 392 rem. | |
| 36. 9 mi. 4 furs. 29 po. 4 yds. 1 ft. 5 in. ... 879 .. | |
| 37. 2673 acres, 1 ro. 23 po. | |
| 38. 207 c. yds. 17 ft. 409 in. | |
| 39. 7 wks. 3 dys. 22 hrs. 55 mins. 44 secs. ... 250 rem. | |
| 40. 10 yrs. 3 mo. 2 wks. 0 dys. 20 hrs. 23 min. 43 secs. ... 489 rem. | |

Ex. VIII. (p. 7.)

- | | | | | |
|----------|----------|---------|---------|----------|
| 1. 251. | 3. 9999. | 5. 897. | 7. 408. | 9. 568. |
| 2. 9416. | 4. 4196. | 6. 635. | 8. 559. | 10. 964. |

Ex. IX. (p. 7.)

- | | | |
|---|--|----------------------------|
| 1. £18 15s. 10d. | 2. 14 yrs. 306 dys. 16 hrs. | |
| 3. 1364. | 4. 5½ yds. | 5. 5 dwts. 3¾ grs. |
| 6. 3 mi. 120 yds. | 7. 270 cwt. | 8. 800000. |
| 9. 55 mi. 270 yds. | 10. 8 mins. 14 4902/48067 secs. | |
| 11. 2859 119/240 crowns, 5718 119/120 half-crowns, 57189 11/12 threepenny pieces,
228759 1/4 threefarthing pieces. | 12. 5s. 6d. | |
| 13. 447 lbs., 43 25/4. | 14. £1717 0s. 7 1/2 d., 22275. | |
| 15. £848 14s. 4 1/2 d. | 16. 2 yds. 2 ft. 3 in. | 17. £52 8s. 2d. |
| 18. one 2 cwt. 2 qrs. 11 lbs., two 2 cwt. 1 qr. 17 lbs. | | |
| 19. 1420, 2330. | 20. 90. | 21. 60 at 12d. 180 at 16d. |
| 22. £344 2s. 0 1/2 d. | 23. 14 acres. | 24. £17 16s. 10 1/2 d. |
| 25. 74 roods, 31 po. 23 yds. 6 19/41 ft. | | 26. 5s. 5d. |
| 27. 7155 3 61/99. | 28. £2863 16s. | 29. 15441 21/43. |
| 30. 1762 22/3. | 31. £647 10s. | 32. £747500 and 31944 5/6. |
| 33. 3 m. 2 fur. 28 po. 6 in.; diff. 3 in. | | 34. 444 4/5. |
| 35. Captain's £309 11s. 8d.; each sailor's £7 14s. 9 1/2 d. | | |
| 36. £2 10s.; he loses £1 11s. 6d. | | 37. 420. |
| 38. Master's £3145 3s. 4d.; each man's £349 9s. 3 5/8 d. | | |
| 39. £149 12s. 4 1/2 d.; 10 18/86 d. | | 40. 840 men. |
| 41. £104 5s. and 17s. 4 1/2 d. | 42. 15; 80. | 43. 900. |
| 44. 30 men, 15 boys. | 45. 1130, 904. | 46. £240, 720s., 960d. |
| 47. 98. 48. Gentlemen £420; Ladies £336. | | 49. 963. |
| 50. 311 omnibusses, 622 horses, 1866 cabs, 6220 foot passengers. | | |
| 51. 30. | 52. £2 5s. 2d. for two; £6 15s. 6d. for one. | |
| 53. 56250 French, 46875 English, 37500 Turks, 9375 Sardinians. | | |
| 54. 300. | 55. 600, 500. | 56. 9s. 8 19/24 d. |
| 57. £394 0s. 3d. | 58. £41 13s. 4 1/2 d.; 2s. 1 14/54 d. | |
| 59. 204. | 60. 10 parts. | 61. gain £1 17s. 6d. |
| 62. £7 10s. | 63. £77 9s. 10d. | 64. £1 3s. 9d. |
| 65. £1159 10s. 5 1/2 d. | 66. lose £33 9s. 6 18/23 d. | |

Ex. X. (p. 13.)

- | | | | | |
|--------|--------|----------|---------|---------|
| 1. 56. | 5. 17. | 9. 267. | 13. 89. | 17. 73. |
| 2. 5. | 6. 4. | 10. 403. | 14. 13. | 18. 6. |
| 3. 7. | 7. 11. | 11. 201. | 15. 47. | 19. 29. |
| 4. 97. | 8. 12. | 12. 3. | 16. 31. | 20. 18. |

Ex. XI. (p. 13.)

1. 27720.	5. 2227680.	9. 1080.	13. 166320.
2. 5040.	6. 720720.	10. 11088.	14. 2646000.
3. 2160.	7. 2520.	11. 112200.	15. 1008.
4. 840.	8. 997920.	12. 18000.	16. 10080.

Ex. XII. (p. 14.)

1. 260865.	8. 165950532.	14. 110250.	20. 11589240.
2. 2663667.	9. 20736.	15. 884520.	21. 8493876.
3. 27300.	10. 31358925.	16. 1061106.	22. 3946110.
4. 576576.	11. 3008745.	17. 6191025.	23. 12229469.
5. 26153820.	12. 6038604.	18. 4845204.	24. 2017790775.
6. 22176.	13. 35307776.	19. 652379.	25. £21.
7. 124200.			

Ex. XIII. (p. 14.)

1. $\frac{11}{20}$	6. $\frac{238}{285}$	11. $\frac{19}{21}$	15. $\frac{13}{131}$
2. $\frac{7}{8}$	7. $\frac{31}{2642}$	12. $\frac{2}{7}$	16. $\frac{61}{254}$
3. $\frac{73}{81}$	8. $\frac{41}{329}$	13. $\frac{3268}{4479}$	17. $\frac{111}{2093}$
4. $\frac{111}{421}$	9. $\frac{11}{13}$	14. $\frac{2687}{3218}$	18. $\frac{74168}{98953}$
5. $\frac{113}{764}$	10. $\frac{37}{41}$		

Ex. XIV. (p. 15.)

1. $\frac{55}{42}$	4. $\frac{907}{180}$	7. $\frac{1255}{336}$	10. $\frac{230435}{66}$
2. $\frac{923}{210}$	5. $\frac{307}{56}$	8. $\frac{5955}{957}$	11. $\frac{901218}{171}$
3. $\frac{479}{168}$	6. $\frac{947}{112}$	9. $\frac{3450}{7}$	12. $\frac{842100}{4297}$

Ex. XV. (p. 15.)

1. $1\frac{103}{187}$.	4. $9\frac{213}{1783}$.	7. $59\frac{113}{1034}$.	10. $479\frac{85}{467}$.
2. $1\frac{25}{143}$.	5. $15\frac{147}{312}$.	8. $87\frac{684}{7013}$.	11. $2075\frac{107}{1364}$.
3. $3\frac{177}{1885}$.	6. $38\frac{17}{546}$.	9. $113\frac{75}{116}$.	12. $896\frac{1254}{3885}$.

Ex. XVI. (p. 15.)

1. $\frac{42}{72}$	2. $\frac{135}{360}$	3. $\frac{98}{210}$	4. $\frac{336}{840}$	5. $\frac{8640}{5460}$	6. $\frac{1914}{3306}$	7. $\frac{980}{1680}$	8. $\frac{700}{840}$	9. $\frac{135}{630}$	10. $\frac{880}{1080}$
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Ex. XVII. (p. 15.)

1. $\frac{2}{3}$.	4. $\frac{7}{4}$.	7. $\frac{44}{5}$.	10. 1.
2. $\frac{9}{5}$.	5. $\frac{37}{44}$.	8. $\frac{532}{1377}$.	11. $\frac{1}{4}$.
3. $14\frac{11}{15}$.	6. $\frac{29}{150}$.	9. $56\frac{5}{11}$.	12. 3.

Ex. XVIII. (p. 16.)

1. $1\frac{4}{7}$.	6. $25\frac{44}{111}$.	11. $50\frac{211}{3465}$.	16. $2653\frac{9}{205}$.
2. $2\frac{14}{150}$.	7. $15\frac{51}{506}$.	12. $31\frac{4}{5}$.	17. $21\frac{204}{204}$.
3. $1\frac{1}{45}$.	8. $49\frac{5}{63}$.	13. $38\frac{20878}{30000}$.	18. 2900.
4. $14\frac{44448}{100000}$.	9. $91\frac{5}{3}$.	14. $55\frac{250}{287}$.	19. $5\frac{557}{630}$.
5. $39\frac{378}{378}$.	10. $167\frac{48}{845}$.	15. $254\frac{99400}{38880}$.	20. $12\frac{234}{2520}$.
21. £303 15s. 3 $\frac{1}{2}$ d.		23. 135 tons. 3 cwt. 2 qrs. 27 $\frac{9}{16}$ lbs.	
22. £2865 13s. 7 $\frac{23}{120}$ d.		24. 3489 acres. 3 ro. 21 $\frac{37}{168}$ po.	

Ex. XIX. (p. 17.)

1. $5\frac{1}{4}$.	6. $10\frac{17}{20}$.	11. $4\frac{41}{110}$.	16. $11\frac{6}{23}$.
2. $8\frac{193}{192}$.	7. $6\frac{6}{25}$.	12. $8\frac{7}{15}$.	17. $13\frac{3}{8}$.
3. $6\frac{1}{2}$.	8. $1\frac{1}{8}$.	13. $\frac{5}{8}$.	18. $11\frac{7}{6}$.
4. $8\frac{3}{4}$.	9. $2\frac{8}{25}$.	14. $4\frac{61}{318}$.	19. $27\frac{3}{8}$.
5. $35\frac{8}{7}$.	10. $3\frac{1}{60}$.	15. $5\frac{9}{24}$.	20. $7\frac{4}{3}$.
21. £94 12s. 0 $\frac{9}{368}$ d.		23. 12 cwt. 0 qr. 19 lbs. 13 $\frac{41}{100}$ oz.	
22. £177 2s. 6 $\frac{1}{2}$ d.		24. 31 yds. 1 ft. 7 $\frac{13}{28}$ in.	

Ex. XX. (p. 17.)

1. $1\frac{7}{3}$.	5. $8\frac{157}{20}$.	9. $11\frac{83}{105}$.	13. $45\frac{73}{120}$.
2. $2\frac{11}{17}$.	6. $9\frac{1}{8}$.	10. $9\frac{281}{480}$.	14. $5\frac{687}{80}$.
3. $4\frac{1}{8}$.	7. $12\frac{19}{18}$.	11. $7\frac{13}{18}$.	15. $16\frac{19}{20}$.
4. $6\frac{1}{8}$.	8. $5\frac{77}{48}$.	12. $6\frac{239}{360}$.	16. $12\frac{735}{448}$.

Ex. XXI. (p. 18.)

- | | | | | | | | | | | | |
|--------------------------|--------------------------|-------------------------------|--------------------|--------------------------------|-------------------------------------|--------------------------------|---------------------|----------------------|------------------------------------|---------------------|---------------------------------|
| 1. $601758\frac{1}{4}$. | 2. $39703\frac{5}{12}$. | 3. $\frac{2}{3}\frac{2}{9}$. | 4. $\frac{1}{3}$. | 5. $1\frac{3}{4}\frac{9}{4}$. | 6. $255632\frac{1}{2}\frac{3}{4}$. | 7. $1\frac{4}{5}\frac{7}{5}$. | 8. $\frac{9}{20}$. | 9. $1\frac{7}{17}$. | 10. $357\frac{5}{24}\frac{1}{5}$. | 11. $\frac{8}{5}$. | 12. $5\frac{1}{2}\frac{9}{8}$. |
|--------------------------|--------------------------|-------------------------------|--------------------|--------------------------------|-------------------------------------|--------------------------------|---------------------|----------------------|------------------------------------|---------------------|---------------------------------|

Ex. XXII. (p. 18.)

- | | | | | | | | | | |
|----------------------|----------------------|---------------------|---------------------|---------------------|--------------------------------|---------------------|---------------------|-------|----------------------|
| 1. $1\frac{21}{2}$. | 2. $2\frac{1}{12}$. | 3. $1\frac{1}{4}$. | 4. $1\frac{7}{8}$. | 5. $3\frac{1}{6}$. | 6. $3\frac{1}{4}\frac{1}{7}$. | 7. $1\frac{1}{8}$. | 8. $\frac{1}{12}$. | 9. 3. | 10. $\frac{1}{12}$. |
|----------------------|----------------------|---------------------|---------------------|---------------------|--------------------------------|---------------------|---------------------|-------|----------------------|

Ex. XXIII. (p. 18.)

- | | | | |
|---|--|--|--|
| 1. $\frac{4}{5}, \frac{2}{1}, \frac{5}{6}, \frac{10}{14}, \frac{3}{4}\frac{1}{7}$. | 2. $14\frac{20}{24}, \frac{7}{10}, \frac{6}{11}, \frac{5}{12}\frac{3}{2}$. | | |
| 3. $\frac{12}{5}, \frac{2}{5}$. | 4. $\frac{9}{13}, 4\frac{2}{8}$. | 5. $-\frac{3}{1}, \frac{1}{2}\frac{1}{7}$. | 6. $\frac{1}{10}, 1\frac{17}{18}$. |
| 7. $\frac{6}{12}, \frac{11}{13}, \frac{8}{15}$. | 8. $\frac{2}{8}\frac{9}{8}, \frac{6}{17}, 2\frac{7}{11}$. | | |
| 9. $\frac{7}{25}$. | 10. $10\frac{1}{4}$. | 11. $18\frac{6}{8}\frac{9}{8}$. | 12. $10\frac{1}{8}$. |
| 13. $9\frac{1}{4}$. | 14. $\frac{7}{15}, \frac{2}{7}$. | 15. $\frac{18}{1}$. | 16. $\frac{7}{9}, 8\frac{4}{9}, 1\frac{1}{4}$. |
| 17. $\frac{10}{11}$. | 18. $\frac{3}{25}, 1\frac{1}{4}$. | 19. $2\frac{2}{3}$. | 20. $1\frac{20}{25}$. |
| 21. $2\frac{1}{14}$. | 22. $\frac{5}{15}$. | 23. $\frac{5}{13}, \frac{10}{18}$. | 24. $1\frac{20}{24}$. |
| 25. $\frac{1}{4}$. | 26. $\frac{2}{7}$. | 27. $39\frac{1}{15}\frac{3}{8}$. | 28. $5\frac{1}{4}$. |
| 29. $\frac{5}{12}$. | 30. $5\frac{5}{4}$. | 31. 15. | 32. $5\frac{5}{4}$. |
| 33. $1\frac{10}{13}$. | 34. $8\frac{6}{15}$. | 35. $20\frac{1}{4}, 37\frac{4}{5}, 12\frac{2}{5}, 17\frac{4}{5}$. | |
| 36. $14\frac{4}{5}, 68\frac{3}{3}\frac{1}{5}$. | | 37. $5\frac{1}{2}$. | 38. $17\frac{8}{5}\frac{9}{10}$. |
| 39. $9\frac{5}{8}, 6\frac{5}{12}, 13\frac{9}{32}, 6\frac{7}{16}$. | | 40. $\frac{1}{4}$. | 41. $1\frac{3}{5}$. |
| 42. $43\frac{1}{10}, 43$. | 43. $14\frac{1}{2}, 4\frac{5}{8}, 23\frac{1}{2}\frac{1}{4}, 4\frac{7}{12}$. | 44. $1\frac{20}{18}$. | |
| 45. $3\frac{1}{8}, 18\frac{1}{12}, 9\frac{7}{24}, 8\frac{1}{4}$. | 46. $18\frac{9}{10}$. | 47. $1\frac{1}{8}$. | |
| 48. $33\frac{8}{14}\frac{1}{10}$. | 49. 0. | 50. $41\frac{9}{16}\frac{7}{8}$. | 51. $5\frac{26}{35}\frac{4}{5}$. |
| 52. $13\frac{3}{14}$. | 53. $\frac{3}{4}$. | 54. 1. - | 55. $1\frac{1}{2}, 4\frac{8}{20}, 1\frac{1}{10}$. |
| 56. $3\frac{28}{36}\frac{1}{6}$. | 57. $1\frac{3}{8}, 14, \frac{4}{1}, 1\frac{1}{5}, 1\frac{7}{16}$. | | 58. $4\frac{1}{10}$. |
| 59. $1\frac{1}{2}$. | 60. $14\frac{4}{8}, 20\frac{1}{15}, 12\frac{4}{13}$. | | |
| 61. $1\frac{1}{8}, -5\frac{7}{6}, -8\frac{5}{12}, -3\frac{2}{3}\frac{1}{4}$. | 62. $8\frac{1}{2}\frac{9}{8}$. | 63. $1\frac{2}{3}\frac{8}{5}$. | |

Ex. XXIV. (p. 22.)

- | | |
|--|--|
| 1. £416 12s. $8\frac{1}{2}d$. | 2. £510 1s. $7\frac{1}{2}d$. |
| 3. 3 qrs. 21 lbs. | 4. £125 4s. 6d. |
| 5. £3184 5s. $7\frac{1}{2}d$. | 6. £569 4s. $1\frac{2}{3}d$. |
| 7. 13 cwt. 2 qrs. $19\frac{2}{3}$ lbs. | 8. 39 lbs. 3 oz. 16 dwts. $13\frac{1}{2}$ grs. |
| 9. £1 18s. | 10. £2 10s. |
| 11. £480 4s. 4d. | 12. £3 8s. $3\frac{1}{4}d$. |

13. £214 17s. 3*1*₄d.
 15. £4 2s. 1*3*₈d.
 17. 18 ms. 0 fur. 14*1*₄ po.
 19. 1s. 8*1*₂d.
 21. 15s. 8*5*₁₃d.
 23. — 2349*1*₈²⁹ yds.
14. £5 1s. 1*3*₄d.
 16. £1084 8s. 7d.
 18. 1s. 10*1*₂d.
 20. 8 roods 0 po. 19*1*₂ yds.
 22. 3492*2*₇ yds.
 24. 1*1*₂⁴⁰₆₀s., 1*1*₂³³₆₀s., 1*1*₂⁸⁰₆₀s.

Ex. XXV. (p. 23.)

- | | | | |
|------------------------------------|-------------------------|-------------------------|--------------------------|
| 1. $\frac{3}{5}$ | 6. $\frac{171}{44800}$ | 11. $\frac{4}{9}$ | 16. $\frac{5728}{13475}$ |
| 2. $\frac{5}{6}$ | 7. $\frac{245}{447}$ | 12. $\frac{4096}{5445}$ | 17. $\frac{207}{223}$ |
| 3. $\frac{359}{31680}$ | 8. $\frac{8}{9}$ | 13. $\frac{75}{224}$ | 18. $\frac{1339}{5103}$ |
| 4. $\frac{1}{288}, \frac{1}{1440}$ | 9. $\frac{189}{640}$ | 14. $\frac{392}{605}$ | 19. $\frac{13}{24}$ |
| 5. $\frac{16}{27}$ | 10. $\frac{378}{11135}$ | 15. $\frac{315}{404}$ | |

Ex. XXVI. (p. 24.)

- | | | | |
|---|---|--|--|
| 1. $1\frac{5}{2}$. | 2. $4\frac{7}{8}$. | 3. $30\frac{1}{4}$. | 4. $\frac{1}{2}$ greatest, $\frac{1}{2}$ least. |
| 5. $3\frac{3}{4}$. | 6. $\frac{1}{8}$. | 7. $1\frac{9}{15}$. | 8. 10s. |
| 9. £156. | 10. $1\frac{7}{10}$. | 11. $1\frac{3}{11}$. | 12. $1\frac{3}{10}, 1\frac{9}{10}, \frac{3}{10}$. |
| 13. $12\frac{1}{189}$. | 14. $\frac{1}{4}$. | 15. $1\frac{65}{12189}$. | 16. £3 7s. 4d. |
| 17. 22 ft. 8 <i>1</i> ₁₁ in. | 18. £464 6s. 4 <i>1</i> ₂ d. | 19. $7\frac{309}{2813}$ d. | 20. $208\frac{11}{17}$ dr. |
| 21. £395 19s. 4d.; £11614 11s. 8d. | | 22. $\frac{12}{925}$. | |
| 23. $2\frac{3}{8}, 26\frac{233}{52}$ guineas. | | 24. £2 5s. 10d. by A; £2 1s. 8d. by B. | |
| 25. A gain of 1s. per lb. Troy. | | 26. $5\frac{5}{11}$, or $38\frac{2}{11}$ mins. past 10. | |
| 27. 1 m. 249 yds. $0\frac{1}{2}$ ft. | | 28. $19\frac{7}{22}$ miles. | 29. £1 13s. 7 <i>1</i> ₂ d. |
| 30. £8 8s. 8d.; A gathers $\frac{1}{4}$ 2s. 1d., B £1 4s. 2d., C £2 1s. 4d. | | | |
| 31. 120; score of each, 15, 12, 12, 6, 6, 6, 15, 15, 15, 15, 3. | | | |
| 32. 100. | 33. £333 6s. 8d.; $\frac{1}{30}$. | | |
| 34. $\frac{7}{10}, \frac{13}{10}, \frac{18}{10}, \frac{8}{10}, \frac{20}{10}, \frac{11}{10}, \frac{1}{2}, \frac{5}{12}$. | | 35. 36. | |
| 36. To $\frac{1}{3}$, by $\frac{1}{4}\frac{1}{2}$. | 37. 25s. | 38. £1320 6s. | |
| 39. £15 6s. 3d. | 40. $89\frac{11}{14}$. | 41. B 6d., C 2s. 6d. | |
| 42. £22 8s. | 43. 192000 miles; 20,000,000,000,000 miles. | | |

Ex. XXVII. (p. 28.)

- | | | |
|-----------------|------------------|-------------------|
| 1. 525·963. | 5. 129·0957967. | 9. 4002·1441415. |
| 2. 125·125. | 6. 544·0703. | 10. 46·704217. |
| 3. 3840·403699. | 7. 133·7951526. | 11. 1032·981262. |
| 4. 1735·52843. | 8. 2375·4562109. | 12. 588·01551757. |

Ex. XXVIII. (p. 28.)

1.	.09.	8.	61·4999573.	15.	7·603082.
2.	.9227.	9.	22·040763218.	16.	94·9553.
3.	.99999.	10.	3·909299315062.	17.	216·285497.
4.	30·718902.	11.	9·59384.	18.	772·844901.
5.	911·28164.	12.	37·184.	19.	107·089806.
6.	16·450374.	13.	30·38824.	20.	4·63739.
7.	251·35235.	14.	11.533845035.		

Ex. XXIX. (p. 28.)

1.	122·122.	8.	.05968964.	15.	.000001.
2.	3·717184.	9.	.225·96942.	16.	.00072.
3.	.00057558775.	10.	44·9992924.	17.	.021042.
4.	.00003738028.	11.	.019203902.	18.	.00005955831.
5.	.0000461652.	12.	2·14065592.	19.	.011214084.
6.	115·469802.	13.	109·45871624.	20.	5·1839697712.
7.	4·5369702.	14.	.000097888.		

Ex. XXX. (p. 29.)

1.	3·012.	16.	30,000.	31.	10·51384615.
2.	750.	17.	34·4352405 +.	32.	.59640.
3.	.0025.	18.	3·0703.	33.	222340.
4.	.057.	19.	2·343.	34.	.057.
5.	813·4.	20.	71·9996400017 +.	35.	711·858.
6.	.0072.	21.	24,000.	36.	.00041.
7.	.0158878 +.	22.	7142857·142857.	37.	1·01650133 +.
8.	.18512518 +.	23.	12·045.	38.	1·90000486 +.
9.	77441·3.	24.	3·47247.	39.	1·11771955 +.
10.	195395·2.	25.	.00000014.	40.	.00910776.
11.	87756·95121.	26.	4·878004.	41.	.0007.
12.	457·037.	27.	81·4632.	42.	239·19.
13.	.45703.	28.	.00168891.	43.	13·7827776.
14.	457037·037.	29.	38·095238.	44.	1·569995.
15.	25·991735 +.	30.	446666·6.	45.	32236·38.
				46.	950·7065.

Ex. XXXI. (p. 30.)

1.	7·425.	4.	9·00764.	7.	3·1416.
2.	5·0625.	5.	4·175.	8.	.00546875.
3.	11·848.	6.	6·0005859375.	9.	.0000005425394 +.

- | | | |
|---------------------|----------------|-----------------|
| 10. 000003426879 +. | 17. 738095238. | 24. 16296. |
| 11. 000001019975 +. | 18. 6060975. | 25. 96875. |
| 12. 000010370109 +. | 19. 243657. | 26. 625. |
| 13. 036. | 20. 670003. | 27. 562926. |
| 14. 8256. | 21. 2020204. | 28. 27182818 +. |
| 15. 170009. | 22. 2380952. | 29. 31415926 +. |
| 16. 143571428. | 23. 112345. | 30. 54930371 +. |

Ex. XXXII. (p. 30.)

- | | | | |
|-----------------------------|---------------------------|-------------------------------|------------------------------|
| 1. $\frac{21}{160}$. | 10. $27\frac{9}{3200}$. | 19. $1\frac{913}{1000}$. | 28. $7\frac{1}{1300}$. |
| 2. $\frac{13}{160}$. | 11. $14\frac{1}{16000}$. | 20. $3\frac{14493}{10000}$. | 29. $27\frac{1}{37}$. |
| 3. $\frac{1}{256}$. | 12. $3\frac{63}{8000}$. | 21. $6\frac{1}{4}$. | 30. $1\frac{1}{7}$. |
| 4. $\frac{49}{25600}$. | 13. $\frac{1}{8}$. | 22. $17\frac{41111}{33000}$. | 31. $3\frac{14237}{3000}$. |
| 5. $12\frac{31}{32}$. | 14. $\frac{1}{64}$. | 23. $9\frac{1}{160}$. | 32. $2\frac{637}{900}$. |
| 6. $2\frac{49}{8000}$. | 15. $\frac{1}{32}$. | 24. $25\frac{1}{3300}$. | 33. $1\frac{11111}{16}$. |
| 7. $17\frac{331}{400000}$. | 16. $4\frac{1}{12}$. | 25. $14\frac{79}{160}$. | 34. $4\frac{3479}{6000}$. |
| 8. $5\frac{91}{128000}$. | 17. $\frac{1}{160}$. | 26. $3\frac{151}{3000}$. | 35. $64\frac{2857}{30000}$. |
| 9. $24\frac{6133}{64000}$. | 18. $\frac{284}{455}$. | 27. $2\frac{284}{633600}$. | 36. $45\frac{2857}{49950}$. |

Ex. XXXIII. (p. 31.)

- | | | |
|-------------------|--------------------|---------------------|
| 1. 1101·680021. | 5. 228·06158069. | 9. 2366·7156105. |
| 2. 132·85357448. | 6. 3840·403800618. | 10. 305·6461725807. |
| 3. 972·8587214. | 7. 462·5694187369. | 11. 1125·854289198. |
| 4. 201·214221678. | 8. 1015·72311038. | 12. 3189·9419072. |

Ex. XXXIV. (p. 31.)

- | | | |
|-------------------|------------------|-----------------|
| 1. 6·1198865. | 7. 0·001638. | 13. 0·00416. |
| 2. 108·0803348. | 8. 106546823. | 14. 26·413. |
| 3. 67·920164728. | 9. 1·9044991793. | 15. 80·663. |
| 4. 100·839235301. | 10. 7·242173. | 16. 5·123. |
| 5. 1000·699920. | 11. 6·114237. | 17. 10·603. |
| 6. 162·0855299. | 12. 9·37024. | 18. 61·4739835. |

Ex. XXXV. (p. 32.)

- | | | |
|-------------------|---------------------|-----------------|
| 1. 5·06081. | 9. 232·3313633675. | 17. ·18. |
| 2. 15·6951219. | 10. 6·79365521960. | 18. 6·3089390+. |
| 3. 96·541544. | 11. 17·37620519749. | 19. ·036. |
| 4. 26·47666807. | 12. 143·0666271486. | 20. ·008. |
| 5. 8·92930. | 13. ·001. | 21. ·323863. |
| 6. 44·2567026655. | 14. 2·6. | 22. ·29954. |
| 7. 144·41355308. | 15. ·004. | 23. ·01336. |
| 8. ·090820089. | 16. 14·7. | 24. 4·34375. |

Ex. XXXVI. (p. 32.)

- | | | |
|-------------|-------------|---|
| 1. 1·16. | 6. 8·24. | 11. 7. |
| 2. ·857142. | 7. ·3. | 12. ·9285714. |
| 3. 13·3. | 8. 175. | 13. ·3198253. |
| 4. ·03. | 9. 4·09. | 14. ·04701. |
| 5. ·297. | 10. 48·734. | 15. 28385 ¹¹¹ ₂₂₈ . |

Ex. XXXVII. (p. 33.)

- | | |
|---|---|
| 1. 16s. 3d.; £1 13s. 5·807d. | 2. 4 cwt. 2 qrs. 21 lbs.; 2 cwt. 17 lbs. 15 oz. |
| 3. £12 11s. 5·616d.; £11 19s. 5·92d. | |
| 4. £79 8s. 10·368d.; £45 11s. 7·32864d. | |
| 5. 12 tons, 6 cwt. 3 qrs. 22·4 lbs.; 14 tons, 3 qrs. 17·43 lbs. | |
| 6. 36 miles, 4 furs. 4·928 yds.; 27 miles, 7 furs. 39 po. 4·28 yds. | |
| 7. 13 lbs. 11 oz. 15 dwts. 1·344 grs.; 26 lbs. 4 dwts. 3·168 grs. | |
| 8. 10s. 6d. | 9. £4 6s. 5·946d. |
| 10. £2 10s. 7d. | 11. 12 tons, 18 cwt. 2 qrs. 16·117 lbs. |
| 12. £2 8s. 1·518d. | 13. £2 0s. 6·0417d. |
| 14. 12 cwt. 1 qr. 17·466 lbs. | 15. 1 cwt. 2 qrs. 20·167 lbs. |
| 16. 167 acres, 2 ro. 3 po. 25·865 yds. | 17. 2s. 5 ³ ₅ d; £4 13s. 8 ¹ ₇ d. |
| 18. 8s. 9·7501d.; £5 12s. 7·39351d. | |
| 19. 29 days, 12 hrs. 44 mins. 2·82 secs.; 5 dys. 12 hrs. 25 mins. 37·92 secs. | |
| 20. (1) £105 2s. 10 ¹ ₂ d. (3) £12 12s. 6d. (5) £15 6s. 3d. | |
| (2) £6 3s. 6d. (4) £27 7s. 3 ³ ₈ d. (6) £8 2s. 1 ⁶ ₁₂₅ d. | |

Ex. XXXVIII. (p. 34.)

- | | |
|-------------------------|-------------------------|
| 1. ·628125; ·289285714. | 3. 3·590625; 1·43625. |
| 2. ·153125; ·1452569 +. | 4. ·296527; ·2812911 +. |

- | | | | |
|-----|--|-----|--|
| 5. | ·2759875; ·331125. | 14. | ·0000363005; ·01133207. |
| 6. | ·6438492063. | 15. | ·900449322089947. |
| 7. | ·44472. | 8. | ·7817. |
| 9. | 5·5380952. | 16. | ·8602678571428; ·4121043+. |
| 10. | 19·2506. | 11. | ·27. |
| 12. | ·002739726+. | 17. | 9·07954; 11·940967+. |
| 13. | ·748509. | 18. | ·43175; ·8429681+. |
| | | 19. | ·17486805; ·1737243+. |
| | | 20. | ·8455. 21. ·016. |
| 22. | (1) 3 c. 1 $\frac{1}{4}$ m.
(2) £24 7 fl. 5 c.
(3) £41 4 fl. 3 c. 7 $\frac{1}{2}$ m.
(4) £7 4 fl. 6 c. 5 m.
(5) £3 7 fl. 2 c. 4 m.
(6) £8 6 fl. 1 c. 5 m. | (7) | £100 7 fl. 2 c. 5 m.
(8) £12 1 fl. 7 c. 5 m.
(9) £19 1 fl. 2 c. 5 m.
(10) £58 3 fl. 0 c. 7 m.
(11) £16 2 fl. 5 c. 7 $\frac{1}{2}$ m.
(12) £11 2 fl. 5 c. 9 m. |

Ex. XXXIX. (p. 35.)

- | | | | |
|-----|---|-----|-----------------------------------|
| 1. | 2·8078; 17·0289; ·0725. | 2. | 210·021021. |
| 3. | 444·45656. | 4. | ·1655808. |
| 6. | 2 $\frac{67}{335}$. | 7. | 7s. 11·81d. |
| 9. | 1 $\frac{69}{12}$. | 10. | 1 rood, 29.92 po. |
| 12. | 30·540336. | 13. | 512000. |
| 15. | $\frac{3}{10}, \frac{1}{2}, .59, \frac{3}{5}, \frac{1}{7}, .87, 1.$ | 16. | $\frac{288}{18525}; \text{£}192.$ |
| 17. | 44·725411507936. | 18. | 9999 times the decimal. |
| 19. | £148 9 fl. 2 c. 1 m. | 20. | £11 16s. 9 $\frac{4}{25}$ d. |
| 21. | £361 8 fl. 9 c. 9 m.; £18 3 fl. 9 c. 6 $\frac{3}{5}$ m. | | |
| 22. | 31·158730; 2·5510620+; ·007; 5·625; 61 $\frac{17}{18}$; 10·135. | | |
| 23. | 0. | 24. | ·04. |
| 27. | $\frac{3772}{53351}$. | 28. | 4 ft. 9·136672 in. |
| 30. | 3·63571 $\frac{1}{2}$ dwts. | 31. | 34 yds. 2 ft. 11·872 in. |
| 32. | 10 ft. 4·592. in. | 33. | 7911·980875 miles. |
| 34. | 32811021·296678+. | 35. | 206264·8. |
| 37. | 62 lbs. 5 oz. 2 $\frac{253}{138637}$ drs; | 38. | 84·133384 gals. |
| 39. | 39·1376 inches. | 40. | 705·7856 lbs. |

Ex. XL. (p. 38.)

- | | | | |
|----|-----------------|----|------------------------------|
| 1. | £1103 12s. 8d. | 4. | £2923 3s. 1 $\frac{1}{2}$ d. |
| 2. | £13278 17s. 0d. | 5. | £27820 18s. 3d. |
| 3. | £1132 3s. 6d. | 6. | £13903 10s. 6d. |

7.	£82654 9s. 1d.	16.	£242 12s. 0 $\frac{1}{16}$ d.
8.	£247049 17s. 11 $\frac{1}{4}$ d.	17.	£352 13s. 9 $\frac{7}{7}$ d.
9.	£187733 16s. 7 $\frac{1}{4}$ d.	18.	£40958 6s. 11 $\frac{5}{3}$ d.
10.	£475529 19s. 9d.	19.	£1869 2s. 3 $\frac{7}{8}$ d.
11.	£1500088 2s. 4 $\frac{1}{4}$ d.	20.	£1473 5s. 7 $\frac{1}{2}$ d.
12.	£37877 5s. 0d.	21.	£17350 11s. 10 $\frac{1}{4}$ d.
13.	£185 0s. 4 $\frac{1}{2}$ d.	22.	£38416 14s. 4 $\frac{1}{3}$ d.
14.	£868 4s. 4 $\frac{1}{6}$ d.	23.	£37097 2s. 10 $\frac{1}{4}$ d.
15.	£32936 12s. 2 $\frac{1}{2}$ d.	24.	£65981 18s. 8 $\frac{5}{11}$ d.

Ex. XLI. (p. 38.)

1.	£250 7s. 9d.	21.	£81 4s. 10 $\frac{1}{2}$ d.
2.	£112 8s. 3 $\frac{3}{4}$ d.	22.	£4266 17s. 9 $\frac{3}{4}$ d.
3.	£21 19s. 1d.	23.	£45 5s. 10 $\frac{5}{7}$ d.
4.	£74086 8s. 7 $\frac{1}{2}$ d.	24.	£742 11s. 2 $\frac{2}{3}$ d.
5.	£8095 4s. 2 $\frac{1}{4}$ d.	25.	£44 9s. 3 $\frac{3}{2}$ d.
6.	£338 5s. 2 $\frac{3}{4}$ d.	26.	£7 18s. 7 $\frac{1}{2}$ d.
7.	£358 19s. 5 $\frac{1}{2}$ d.	27.	647 oz. 16 dwts. 0 10 $\frac{3}{4}$ gras.
8.	£2162 12s. 1 $\frac{5}{8}$ d.	28.	£517 14s. 5 $\frac{3}{16}$ d.
9.	£12761 2s. 5 $\frac{5}{8}$ d.	29.	£44 3s. 0 $\frac{1}{2}$ d.
10.	£2208 9s. 8 $\frac{1}{8}$ d.	30.	£129 15s. 10d.
11.	£84 8s. 6d.	31.	£548 8s. 8 $\frac{1}{2}$ d.
12.	£951 19s. 10d.	32.	£21 9s. 3 $\frac{1}{4}$ d.
13.	£136 19s. 11d.	33.	£574 3s. 11 $\frac{5}{14}$ d.
14.	£44 14s. 6 $\frac{1}{2}$ d.	34.	£1577 7s. 10 $\frac{2}{11}$ d.
15.	£115 8s. 4 $\frac{5}{16}$ d.	35.	£1312 14s. 10 $\frac{8}{1280}$ d.
16.	£45 19s. 0 $\frac{11}{128}$ d.	36.	£176 17s. 7 $\frac{1}{2}$ d.
17.	£309 2s. 10 $\frac{1}{2}$ d.	37.	£70 15s. 9 $\frac{9}{1280}$ d.
18.	£2164 8s. 9 $\frac{3}{2}$ d.	38.	£46 4s. 10 $\frac{1}{2}$ d.
19.	5 lbs. 11 oz. 15 $\frac{1}{2}$ grs.	39.	£7 9s. 7 $\frac{1}{2}$ d.
20.	£2854 15s. 5 $\frac{2}{3}$ d.	40.	£40 8s. 3d.

Ex. XLII. (p. 40.)

1.	$\frac{21}{20}$; 300; 70; .0279888 +.	2.	2.04228 +.	3.	.00426.
4.	27 lbs. 6 oz. 6 dwts.	5.	£1 0s. 2 $\frac{1}{4}$ d.	6.	2s. 3d.
7.	1 $\frac{1}{571}$ minute.	8.	£562 8s. 2d.	9.	14s. 7 $\frac{1}{2}$ d.
10.	£44 17s. 8 $\frac{1}{2}$ d.	11.	20s. 5 $\frac{5}{11}$ d.	12.	£64 4s.

13. 17s. $3\frac{2}{3}d.$ 14. £1610; 4s.
 15. 6s. 8d.; £3833 6s. 8d., £3500, £116 18s. 4d.
 16. £203 16s. 2d. 17. £450. 18. £760.
 19. £580. 20. 933 $\frac{1}{2}$ lbs. yearly; 2 $\frac{1}{2}\frac{2}{3}$ lbs. daily.
 21. 38 yds. 0 qrs. 3 $\frac{1}{4}$ nls. 22. 14 $\frac{2}{7}$ s. 23. £9506 3s. 5 $\frac{1}{2}\frac{2}{3}$ d.
 24. £983 2s. 2 $\frac{2}{3}$ d. 25. 3 $\frac{1}{4}$. 26. 534 lbs. 8 oz. 13 dwts. 8 grs.
 27. 1 $\frac{9}{45}$ c. in.; 37 lbs. 28. 10 $\frac{3}{4}$ drs. Av.; 291 $\frac{1}{2}$ grs. Troy.
 29. £2 6s. 5 $\frac{1}{2}\frac{2}{3}$ d. 30. £2 14s. 7 $\frac{1}{4}$ d. 31. 6s. 8d.; 12 oz.
 32. 288. 33. 11 $\frac{1}{4}$ hrs. 34. 400. 35. 11s. 6d.
 36. £1 8s. 11 $\frac{2}{3}\frac{2}{3}$ d. 37. 1 $\frac{6}{7}$ before 12. 38. 4 $\frac{1}{3}\frac{2}{3}$ days.
 39. 4 $\frac{5}{8}$ dys. 40. 3 $\frac{3}{8}\frac{7}{4}$. 41. £3168000. 42. £214 5s. 8 $\frac{1}{4}\frac{2}{3}$ d.; 2 $\frac{1}{2}\frac{2}{3}$ d.
 43. 2 $\frac{1}{2}$ secs. slow. 44. 231 miles. 45. £6865 13s. 8 $\frac{9}{44}\frac{2}{3}$ d.
 46. 40 miles. 47. 120 yds. 48. 6 mi. 3 furs. 24 $\frac{1}{2}\frac{2}{3}$ yds.
 49. 2s. 1 $\frac{6}{8}\frac{2}{3}\frac{5}{8}$ d.; 2 $\frac{6}{8}\frac{9}{4}\frac{1}{4}$ d. 50. 275625.

Ex. XLIII. (p. 44.)

1. £114 6s. 14. 140. 28. 48.
 2. 2440. 15. 7 days 2 hours. 29. 8.
 3. 15 cwt. 16. £2 2s. 9 $\frac{1}{2}$ d. 30. 5 $\frac{3}{15}$.
 4. 300. 17. 25 tons 15 cwt. 2 qrs. 31. £1 9s. 2 $\frac{1}{1}\frac{9}{600}$ 0.
 5. 3 $\frac{2}{3}$ days. 18. 51. 32. 22 $\frac{1}{2}$.
 6. 9. 19. 23 $\frac{8}{2}\frac{5}{1}\frac{4}{2}\frac{9}{5}$. 33. 56.
 7. 500 reams. 20. 18s. 1 $\frac{3}{8}$ d. 34. 54.
 8. 20. 21. 19 $\frac{9}{2}\frac{5}{6}$. 35. 10.
 9. 155 $\frac{3}{4}$. 22. 300. 36. 180.
 10. £61 18s. 5d. 23. 12 cwt. 1 qr. 14 lbs. 37. 27.
 11. £6 0s. 3 $\frac{1}{4}$ d. 24. £6 2s. 6d. 38. 164 dys. 6 $\frac{1}{2}\frac{4}{3}$ hrs.
 12. 16. 25. 2 $\frac{1}{5}$. 39. 73.
 13. 98. 26. 6. 40. 90.
 27. £97 0s. 4 $\frac{4}{5}$ d.

Ex. XLIV. (p. 47.)

1. £9 3s. 5 $\frac{1}{2}$ d., £17 0s. 8 $\frac{1}{2}$ d.
 2. £142 18s. to A, £224 11s. 1 $\frac{5}{7}$ d. to B, £347 0s. 10 $\frac{2}{7}$ d. to C.
 3. £36 3s., £54 4s. 6d., £66 5s. 6d.
 4. A £10 5s. 10 $\frac{1}{2}\frac{9}{7}$ d., B £11 15s. 3 $\frac{9}{17}$ d., C £13 4s. 8 $\frac{8}{17}$ d., D £14 14s. 1 $\frac{7}{17}$ d.
 5. House £584 7s. 6d., garden £265 12s. 6d.
 6. £10666 13s. 4d., £16000, £21333 6s. 8d.

7. 4 dwts. $16\frac{1}{4}$ grs. gold, $10\frac{1}{4}$ grs. copper.
8. £116 13s. 4d., £163 6s. 8d., £186 13s. 4d., £233 6s. 8d.
9. 300 lbs. 5 oz. $6\frac{1}{4}$ dwts. silver, 66 lbs. 9 oz. $3\frac{7}{11}$ dwts. alloy.
10. $57\frac{1}{4}$, $40\frac{2}{3}$, $91\frac{8}{9}$, $10\frac{3}{4}$.
11. $48\frac{3}{4}$ lbs. gold, $62\frac{3}{4}$ lbs. silver, $5\frac{1}{4}$ lbs. copper.
12. 12 cwt. nitre, 2 cwt. 1 qr. $16\frac{4}{5}$ lbs. charcoal, 1 cwt. 2 qrs. $11\frac{1}{5}$ lbs. sulphur.
13. $37\frac{1}{2}$ minutes.
14. £150, £300, £450.
15. 4 hrs. $12\frac{1}{4}$ mins.
16. £391, £529, £1311.
17. A receives and B pays £8 8s. 11d.
18. £83 17s. $10\frac{11}{25}$ d.
19. £20 17s. $3\frac{9}{127\frac{1}{4}}$ d., £39 13s. $0\frac{116\frac{1}{4}}{127\frac{1}{4}}$ d., £59 9s. $7\frac{475}{127\frac{1}{4}}$ d.
20. 65000 gals.
21. A £350, B £450.
22. £184 13s. $5\frac{181}{1800}$ d.
23. £112 16s. $8\frac{4}{9}$ d., £206 17s. $3\frac{5}{8}$ d., £310 5s. $11\frac{3}{4}$ d.
24. 135 cwt. 0 qrs. $22\frac{1}{4}$ lbs.
25. $8\frac{1}{4}$ cwt., $11\frac{1}{4}$ cwt.
26. 96 yds. at 12s. 6d., 108 yds. at 13s. 9d.

Ex. XLV. (p. 49.)

- | | |
|---|---|
| 1. 12 days. | 11. $3\frac{99}{107}$ days, $8\frac{4}{7}$ days. |
| 2. $2\frac{2}{3}$ days. | 12. 156 days. |
| 3. $17\frac{1}{4}$ mins. | 13. 10 days. |
| 4. 3 days. | 14. $2\frac{16}{37}$ days. |
| 5. $17\frac{4}{25}$ days. | 15. $3\frac{58}{109}$ days. |
| 6. $1\frac{103}{167}$ day; A in 5, B 6, C 7 days. | 16. $2\frac{1}{4}$ hours. |
| 7. 8 dys; A in $17\frac{1}{4}$, B 24, C 40 dys. | 17. $7\frac{482}{5744}$ days. |
| 8. A and B in $3\frac{27}{56}$, C in $8\frac{19}{22}$ days. | 18. 3 hours. |
| 9. 120 hours. | 19. $2\frac{19}{184}$ hours, $2\frac{32}{121}$ hours. |
| 10. A 48 hrs., B 36 hrs., C $28\frac{4}{5}$ hrs.,
B and C $20\frac{4}{5}$ hrs. | 20. $57\frac{3}{5}$ hours. |

Ex. XLVI. (p. 51.)

- | | | |
|-----------|--------------------------------|-------------------------------|
| 1. 150. | 5. 4650. | 8. 114. |
| 2. 36450. | 6. £19 10s. $7\frac{1}{2}$ d., | 9. £10 14s. $3\frac{3}{4}$ d. |
| 3. 1632. | 25 francs = £1. | 10. Gains £11 5s. |
| 4. 2508. | 7. 80. | |

Ex. XLVII. (p. 52.)

- | | |
|---|----------------------------------|
| 1. £41 2s. $11\frac{3}{4}$ d. | 5. £408 10s. $3\frac{1}{4}$ d. |
| 2. £42 3s. $6\frac{1}{2}\frac{1}{4}$ d. | 6. £3502 15s. $0\frac{12}{5}$ d. |
| 3. £1 4s. $8\frac{3}{8}$ d. | 7. £240 0s. $2\frac{7}{200}$ d. |
| 4. £87 16s. $3\frac{12}{160}$ d. | 8. 10s. $2\frac{7}{25}$ d. |

- | | |
|----------------------------------|--|
| 9. £4 7s. 6d. | 13. £1255 1s. 9 $\frac{1}{12}\frac{1}{5}$ d. |
| 10. £673 16s. 6 $\frac{1}{4}$ d. | 14. £1 11s. 6 $\frac{2}{3}\frac{6}{5}$ d. |
| 11. £845 0s. 0d. | 15. 18s 5 $\frac{3}{12}\frac{9}{5}$ d. |
| 12. £810 6s. 9d. | 16. £419 15s. 5 $\frac{1}{12}\frac{7}{10}\frac{9}{5}$ d. |

Ex. XLVIII. (p. 53.)

- | | |
|---|---|
| 1. £2 13s. 7 $\frac{1}{2}$ d. | 7. £3 3s. 11 $\frac{2}{3}$ d. |
| 2. £1 5s. 0d. | 8. £307 10s. 5 $\frac{6}{7}\frac{1}{5}$ d. |
| 3. £43878 0s. 0d. | 9. £1150 17s. 1 $\frac{1}{3}\frac{1}{5}$ d. |
| 4. £99 18s. 7 $\frac{6}{7}\frac{1}{5}$ d. | 10. £17 7s. 7 $\frac{2}{3}\frac{7}{5}$ d. |
| 5. £23 9s. 4 $\frac{6}{7}\frac{1}{5}$ d. | 11. £36 2s. 5 $\frac{2}{3}\frac{3}{5}$ d. |
| 6. £347 17s. 10 $\frac{1}{2}\frac{1}{5}$ d. | 12. £2195 17s. 11 $\frac{6}{7}\frac{1}{5}$ d. |

Ex. XLIX. (p. 54.)

- | | | |
|------------------------------|-------------------------------------|---|
| 1. 5 yrs. | 9. £560. | 17. £4331 5s. |
| 2. 17 yrs. | 10. 3 $\frac{2}{3}\frac{5}{7}$ yrs. | 18. £3054 5s. |
| 3. 13 $\frac{1}{2}$ yrs. | 11. 3 $\frac{1}{4}$ per cent. | 19. £1050; 4 per cent. |
| 4. 3 $\frac{1}{2}$ per cent. | 12. £879 2s. 5 $\frac{1}{2}$ d. | 20. £13333 6s. 8d. |
| 5. 3 $\frac{1}{2}$ per cent. | 13. 3 $\frac{1}{4}$ per cent. | 21. The latter. |
| 6. 3 $\frac{1}{2}$ per cent. | 14. 48 yrs. | 22. 917 : 800; £6321 18s. 4 $\frac{5}{9}\frac{8}{7}$ d. |
| 7. £2736 10s. 6d. | 15. 1980 yrs. | 23. £639 17s. 0 $\frac{1}{4}\frac{1}{5}$ d. |
| 8. £350 10s. | 16. £246; 4 p. c. | 24. £1030 6s. 0 $\frac{1}{2}\frac{1}{5}$ d. |

Ex. L. (p. 56.)

- | | |
|---|--|
| 1. £120. | 12. £39 0s. 0d. |
| 2. £38 14s. 10d., £1162 5s. | 13. £4 15s. 2 $\frac{1}{2}$ d.; 4s. 9 $\frac{1}{4}$ d. |
| 3. £16 17s. 6d. | 14. £4 7s. 4 $\frac{1}{2}\frac{1}{5}$ d. |
| 4. £48 9s. 0d. | 15. £336 18s. 3 $\frac{8}{7}\frac{1}{5}$ d. |
| 5. £245 0s. 0d. | 16. £224 17s. 10 $\frac{2}{3}\frac{1}{5}$ d. |
| 6. £666 13s. 4d. | 17. £2 1s. 8 $\frac{2}{3}\frac{1}{5}$ d. |
| 7. £144 11s. 6 $\frac{1}{2}$ d. | 18. £6 18s. 8 $\frac{2}{3}\frac{1}{5}$ d. |
| 8. £273 15s. 0d.; 18s. | 19. 5 per cent. |
| 9. £34288 6s. 6 $\frac{2}{3}\frac{1}{5}$ d. | 20. 4 per cent. |
| 10. £46 3s. 0 $\frac{1}{2}\frac{1}{5}$ d. | 21. £2 6s. 8d. |
| 11. £50 0s. 0d. | 22. 40 : 41. |

Ex. LI. (p. 57.)

- | | |
|---|-------------------------------------|
| 1. £13 3s. 9d. | 16. £141 5s. |
| 2. £408 5s. 11 $\frac{3}{5}$ d. | 17. £800; £2 increase. |
| 3. £1284 11s. 11 $\frac{3}{5}$ d. | 18. £136 5s. |
| 4. £588 5s. | 19. 89 $\frac{1}{2}$ s. |
| 5. £116 14s.; more. | 20. lose .018 per cent. nearly. |
| 6. £706 5s. | 21. £2 10s. more. |
| 7. £5014 18s. 6 $\frac{6}{7}$ d.; £146 1s. 2 $\frac{2}{7}$ d. | 22. £25. |
| 8. £3574 4s. 10 $\frac{5}{7}$ d.; £104 1s. 11 $\frac{7}{8}$ d. | 23. £3 2s. 0 $\frac{2}{3}$ d. |
| 9. 3 $\frac{3}{4}$ per cent.; £46 10s. 10 $\frac{1}{4}$ d. | 24. 8s. 10 $\frac{1}{2}$ d. loss. |
| 10. 77 $\frac{7}{8}$; £1542 17s. 1 $\frac{1}{2}$ d. | 25. £2133 6s. 8d. |
| 11. 3 $\frac{1}{2}$ p. c.; 3 $\frac{1}{2}$ p. c.; 1 $\frac{5}{8}$ p. c. | 26. £6 5s. more. |
| 12. The 1st by £8 19s. 3 $\frac{1}{2}$ d. | 27. £11 16s. 8d. |
| 13. £15708 6s. 8d. | 28. £264 12s. |
| 14. £244 13s. | 29. £20000; £225000. |
| 15. The latter. | 30. £242914 19s. 7 $\frac{3}{4}$ d. |

Ex. LII. (p. 60.)

- | | | |
|----------------------------------|---|---|
| 1. 10 $\frac{30}{107}$ per cent. | 11. 15 $\frac{1}{2}\frac{5}{8}$ per cent. | 21. 5d. |
| 2. 2 $\frac{8}{3}$ per cent. | 12. 4 per cent lost. | 22. £2 9s. 5 $\frac{1}{3}\frac{1}{4}$ d. |
| 3. £75 18s. 7 $\frac{7}{11}$ d. | 13. £190 6s. 5 $\frac{1}{2}\frac{1}{4}$ d. | 23. 18 $\frac{1}{4}$ gals. |
| 4. £43 10s. 8 $\frac{4}{9}$ d. | 14. 2s. 6d.; 4 $\frac{1}{2}$ d. | 24. £4000000. |
| 5. 15s. 4 $\frac{1}{4}$ d. | 15. £45. | 25. loses £12 13s. 9d. |
| 6. 21 $\frac{7}{33}$ per cent. | 16. 1 of former to 16
of latter. | 26. £1391 5s. |
| 7. 14 $\frac{2}{3}$ per cent. | | 27. £3 18s. |
| 8. £185. | 17. 6 $\frac{2}{3}\frac{1}{2}$ d. or 1 $\frac{1}{10}$ p. c. | 28. 4 $\frac{1}{2}$ lbs. |
| 9. £1000. | 18. 4 per cent. loss. | 29. 21 $\frac{3}{4}\frac{7}{13}\frac{7}{8}$ per cent. |
| 10. 9d. | 19. 7 $\frac{1}{2}\frac{1}{2}$ d. | 30. £1 8s. 9 $\frac{1}{15}$ d. - |
| | 20. £3 12s. 6d. per qr. | |

Ex. LIII. (p. 62.)

- | | | |
|---|---|---------------------------|
| 1. 222 ft. 11' 11". | 2. 9831 ft. 3'. | 3. 147 ft. 7' 11" 7" 6"". |
| 4. 37 ft. 7' 1" 7" 6"". | 5. 23 sq. yds. 2 ft. 186 $\frac{1}{16}$ in. | |
| 6. 9 c. yds. 2 ft. 1636 $\frac{1}{4}$ in. | 7. 2552 c. ft. 1088 in. | |
| 8. 219 yds. 8 ft. 18 in. | 9. 101 ft. 1692 in. | |

10. 353 sq. ft. 54 in.; 3769 c. ft. 576 in. 11. 4482 ft. 1584 in.
 12. 74 sq. yds. $2\frac{3}{8}$ ft. 13. $48\frac{2}{3}$ ft. 14. 6 ft.
 15. 2 ft. 10' 3", 5 ft. 6' 7" 2"'; 1 ft. $11\frac{1}{2}$ in. 16. 61 ft. $2\frac{2}{7}$ in.
 17. $2629\frac{1}{8}$ c. ft. 18. $21\frac{1}{2}$ in. 19. 819 c. ft. 1675 in.
 20. 436 ft. 136 in. in floor; 4915 ft. 1080 in. in volume; 1822 ft. 92 in. in surface.
 21. £242 1s. $10\frac{1}{2}$ d. 22. £7 8s. $4\frac{1}{2}$ d.
 23. £6 5s. $10\frac{5}{12}$ d. 24. £8 14s. $9\frac{3}{8}$ d.
 25. 83 yds. 0 ft. $10\frac{2}{3}$ in. 26. 190 ft. 129 in.; £6 0s. $2\frac{35}{63}$ d.
 27. £1 12s. $4\frac{2}{3}$ d.; £7 3s. $2\frac{3}{4}$ d. 28. 33 yds. $7\frac{1}{3}$ in.; £7 12s. $2\frac{13}{24}$ d.
 29. 88 yds. 2 ft. $2\frac{1}{8}$ in.; £2 15s. $5\frac{5}{108}$ d. 30. £728 15s.
 31. 481 c. ft. 32. $112\frac{1}{2}$ ft. 33. 156 sq. yds. $2\frac{1}{4}$ ft.
 34. 195 sq. yds. 35. 63 ft. 120 in.; £2 2s. $6\frac{1}{2}$ d. 36. 134505.
 37. 360 yds. 8 ft. 78 in.; 198 yds. 6 ft. 60 in. 38. 182250.
 39. £11 9s. $7\frac{5}{8}$ d.; £14 2s. $8\frac{2}{3}$ d. 40. £6 5s. $11\frac{14}{64}$ d.
 41. £23 17s. 4d. 42. 72 yds. 0 ft. $3\frac{1}{2}$ in.; 9s. $0\frac{22}{13}\frac{1}{8}$ d.
 43. £19 5s. $5\frac{67}{100}$ d. 44. 260 ft. 12 in.; £21 13s. $5\frac{3}{8}$ d.
 45. £8 12s. $11\frac{5}{8}$ d. 46. 77 ft. 84 in.; £1 3s. $1\frac{1}{8}$ d.
 47. 480; £1 15s.; £1 4s. $5\frac{3}{4}$ d. 48. $40\frac{65}{884}$ oz.; £1 7s. $10\frac{3481}{6416}$ d.
 49. 24000. 50. 7 hrs. 48 mins.

Ex. LIV. (p. 66.)

1. 359. 9. 98·01. 17. 2·680223 +. 25. 1·2744576 +.
 2. 62·41. 10. ·07403. 18. 3080·06. 26. $\frac{16}{15}$.
 3. ·13125. 11. 2·423839 +. 19. 80·089. 27. $55\frac{1}{4}$.
 4. 490·304. 12. 1·036822 +. 20. ·01302. 28. $6\frac{7}{15}$.
 5. 9·852. 13. 3476905. 21. ·13125. 29. ·849836 +.
 6. ·008997. 14. ·083666 +. 22. ·0950625. 30. 2·809401 +.
 7. ·14142136 +. 15. ·176068 +. 23. ·972435 +. 31. 15·821504 +.
 8. ·0316227 +. 16. 23·181889 +. 24. ·141027 +.

Ex. LV. (p. 66.)

1. 32. 7. 8·75. 13. 234. 19. 8·099. 25. ·425.
 2. 503. 8. 611. 14. 1936. 20. $\frac{1}{3}$; $7\frac{1}{2}$. 26. ·425.
 3. 203. 9. 613. 15. 2222. 21. $37\frac{1}{2}$.
 4. ·111. 10. 411. 16. ·1199. 22. $\frac{5}{2}$.
 5. 30·02. 11. 512. 17. 62·41. 23. ·69336127 +.
 6. 61·4. 12. 3·17. 18. 4835. 24. 1·56049 +.

Ex. LVI. (p. 67.)

- | | |
|--|--|
| 1. 1·14. | 2. 1·22474 +, 2·44948 +, 1·63299 +. |
| 3. 1·29099 +, 3·87298 +, 1·16189 +. | |
| 4. 2·645751 +, 3·77964 +, 1·322875 +, .881917 +. | |
| 5. 6·16, 1·232. | 6. 21 c.in. 7. 914 yds. 1 ft. 7 in.; £17 2s. 9 ₂₈₈ ¹¹ d. |
| 8. 99·4956 + yds. | 9. 1369 sq. ft. 10. 99 yds. |
| 11. £7 4s. 6d. | 12. 4 ft. 4 in. 13. 5·35546 + yds. |
| 14. 2112; .0125. | 15. 81. 16. 40·52997 + ft. |
| 17. 1455 yds. | 18. 3365 yds. 19. 4044 yds. 4 ft. |
| 20. 20·87317 + ft. | 21. .4450576 +. |

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